⚠ IMPORTANT SAFETY NOTICES

PREVENTION OF PHYSICAL INJURY

1. Before disassembling or assembling parts of the copier and peripherals, make sure that the copier power cord is unplugged.
2. The wall outlet should be near the copier and easily accessible.
3. Note that some components of the copier and the paper tray unit are supplied with electrical voltage even if the main switch is turned off.
4. If any adjustment or operation check has to be made with exterior covers off or open while the main switch is turned on, keep hands away from electrified or mechanically driven components.
5. If the start key is pressed before the copier completes the warm-up period, keep hands away from the mechanical and the electrical components as the copier starts making copies as soon as the warm-up period is completed.
6. The inside and the metal parts of the fusing unit become extremely hot while the copier is operating. Be careful to avoid touching those components with your bare hands.

HEALTH SAFETY CONDITIONS

1. Toner and developer are non-toxic, but if you get either of them in your eyes by accident, it may cause temporary eye discomfort. Try to remove with eye drops or flush with water as first aid. If unsuccessful, get medical attention.

OBSERVANCE OF ELECTRICAL SAFETY STANDARDS

1. The copier and its peripherals must be installed and maintained by a customer service representative who has completed the training course on those models.
2. The RAM board on the main control board has a lithium battery which can explode if replaced incorrectly. Replace the battery only with an identical one. The manufacturer recommends replacing the entire RAM board. Do not recharge or burn this battery. Used batteries must be handled in accordance with local regulations.

SAFETY AND ECOLOGICAL NOTES FOR DISPOSAL

1. Do not incinerate the toner bottle or the used toner. Toner dust may ignite suddenly when exposed to open flame.
2. Dispose of used toner, developer, and organic photoconductor according to local regulations. (These are non-toxic supplies.)
3. Dispose of replaced parts in accordance with local regulations.
4. When keeping used lithium batteries in order to dispose of them later, do not put more than 100 batteries per sealed box. Storing larger numbers or not sealing them apart may lead to chemical reactions and heat build-up.

SWALLOW 2

(Machine Code: A212/A214)

Service Manual

– *Insert Version* –

The A212 copier is based on the A161 copier.
The A214 copier is based on the A162 copier.

Only the differences from the A161/A162 copier are described in the following pages. Refer to the A161/A162 copier service manual for more information.

1. SPECIFICATIONS

NOTE: Only items marked with ✻ are different from A161 and A162 copiers.

Configuration:	Desktop
Copy Process:	Dry electrostatic transfer system
Originals:	Sheet/Book
Original Size:	Maximum: A3/11" x 17"
Copy Paper Size:	Maximum: A3/11" x 17" (Paper trays) Minimum: A5/81/2" x 51/2" sideways (Paper trays) A4/11" x 81/2" sideways (LCT) A6/51/2" x 81/2" lengthwise (By-pass)
Duplex Copying:	Maximum: A3/11" x 17" Minimum: A5/81/2" x 51/2" (sideways)
Copy Paper Weight:	Paper tray: 64 ~ 90 g/m^2, 17 ~ 24 lb By-pass: 52 ~ 157 g/m^2, 14 ~42 lb LCT: 52 ~ 128 g/m^2, 14 ~ 34 lb Duplex copying: 64 ~ 90 g/m^2, 17 ~ 24 lb (feeding from the Paper tray) 64 ~ 105 g/m^2, 17 ~ 24 lb (feeding from the LCT)
Reproduction Ratios:	4 Enlargement and 6 Reduction

	A4/A3 Version	LT/DLT Version
Enlargement	200% 141% 122% 115%	200% 155% 129% 121%
Full size	100%	100%
Reduction	93% 82% 75% 71% 65% 50%	93% 85% 77% 74% 65% 50%

Power Source: 120 V/60 Hz:
More than 12 A (for North America)
220 V ~ 240 V/50 Hz:
More than 7 A (for Europe)
220 V/50 Hz:
More than 7 A (for Asia)
110 V/60 Hz:
More than 14 A (for Taiwan)
220 V/60 Hz:
More than 7 A (for Saudi Arabia, Philippines)

✻ Power Consumption:

		Copier Only	**Full System**
Maximum		1.45 kW	1.50 kW
Copying		0.64 kW	0.72 kW
Warm-up		0.95 kW	0.97 kW
Stand-by		0.15 kW	0.17 kW
Energy Saver	1	0.14 kW	0.16 kW
	2	0.12 kW	0.13 kW
	3	0.09 kW	0.10 kW
	4	0.07 kW	0.08 kW
	5	0.05 kW	0.06 kW
Auto Off		0.02 kW	0.04 kW

NOTE: 1) Full System: Copier + ADF + Paper Tray Unit + 10 Bin S/S
2) Energy Saver: See SP1-105-002
3) Auto Off: See SP5-305

✻ Noise Emission:

	Copier Only	**Full System***
1. Sound Power Level		
Copying	65 dB(A)	70 dB(A)
Stand-by	40 dB(A)	40 dB(A)
2. Sound Pressure Level at the operator position		
Copying	60 dB(A)	64 dB(A)
Stand-by	40 dB(A)	40 dB(A)

NOTE: The above measurements were made in accordance with ISO 7779.
* : Full System: Copier + ADF + Paper Tray Unit +10 Bin S/S.

✻ Dimensions:

	Width	Depth	Height
A212 copier	900 mm (35.5")	655 mm (25.8")	626 mm (24.7")
A214 copier	1,128 mm (44.5")	655 mm (25.8")	626 mm (24.7")

Measurement Conditions
1) With by-pass feed table closed
2) With platen cover and copy tray attached
3) With LCT cover closed

Weight:

	Weight
A212 copier	About 67 kg (147.7 lb)
A214 copier	About 80 kg (176.4 lb)

Zoom:	From 50% to 200% in 1% steps
Copying Speed (copies/minute):	22 copies/minute (A4/11" x 81/2" sideways) 12 copies/minute (A3/11" x 17")
Warm-Up Time	Less than 60 seconds (at 20°C/68°F)

First Copy Time:

Paper Feed Station	A4/11" x 81/2" (sideways)
1st Tray	5.9 s (except for A214)
2nd Tray	6.6 s
By-pass	5.6 s
LCT	5.9 s

NOTE: In the A214 copier, the 2nd tray in the above table is called the 1st tray (see Installation - Paper Feed Station Definition of the base copier service manual).

Copy Number Input:	Ten-key pad, 1 to 999 (count up or count down)
Manual Image Density Selection:	7 steps
Automatic Reset:	1 minute is the standard setting; it can be changed to a maximum of 999 seconds or no auto reset by SP mode.

✻ Copy Paper Capacity:

	Paper Tray	By-pass Feed	LCT
A212 copier	About 500 sheets x 2	About 40 sheets	—
A214 copier	About 500 sheets x 1	About 40 sheets	About 1,000 sheets

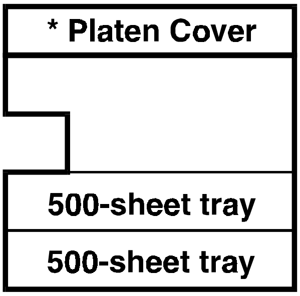
Duplex Tray Capacity [A214]:	50 sheets (30 sheets for A3/11"x17" 81 ~ 105 g/m^2, 21.5 ~ 27.9 lb paper)
Toner Replenishment:	Cartridge exchange (415 g/cartridge)
✻ Optional Equipment (Sales items):	• Platen cover (except for A212 machines with destination code 29) • Document feeder • 10-bin sorter stapler • 20-bin sorter stapler • 20-bin mini sorter • 10-bin micro sorter • Sorter adapter (required when installing a 10-bin sorter stapler or 20-bin mini sorter) • 1,500-sheet tray unit (three 500-sheet trays) • 1,000-sheet tray unit (two 500-sheet trays) • 500-sheet tray unit (two 250-sheet trays)
Optional Equipment (Service items):	• Original length sensor for 11" x 15" size paper (only for LT/DLT version) • Tray heater • Optical anti-condensation heater • ADS sensor for particular types of red original
Optional Equipment (To be procured locally):	• Key counter

2. MACHINE CONFIGURATION

2.1 COPIER

– A212 copier –

Two 500-sheet trays

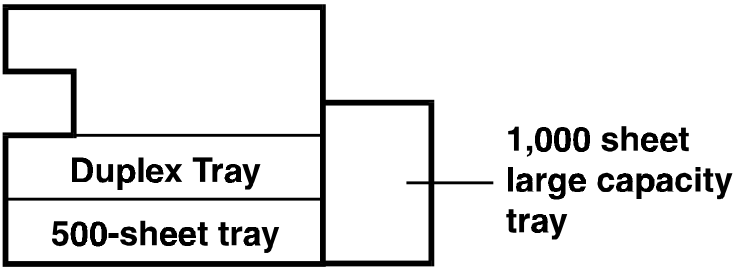

* Platen Cover
500-sheet tray
500-sheet tray

A212V500.wmf

*: Only for machines with destination code 29.

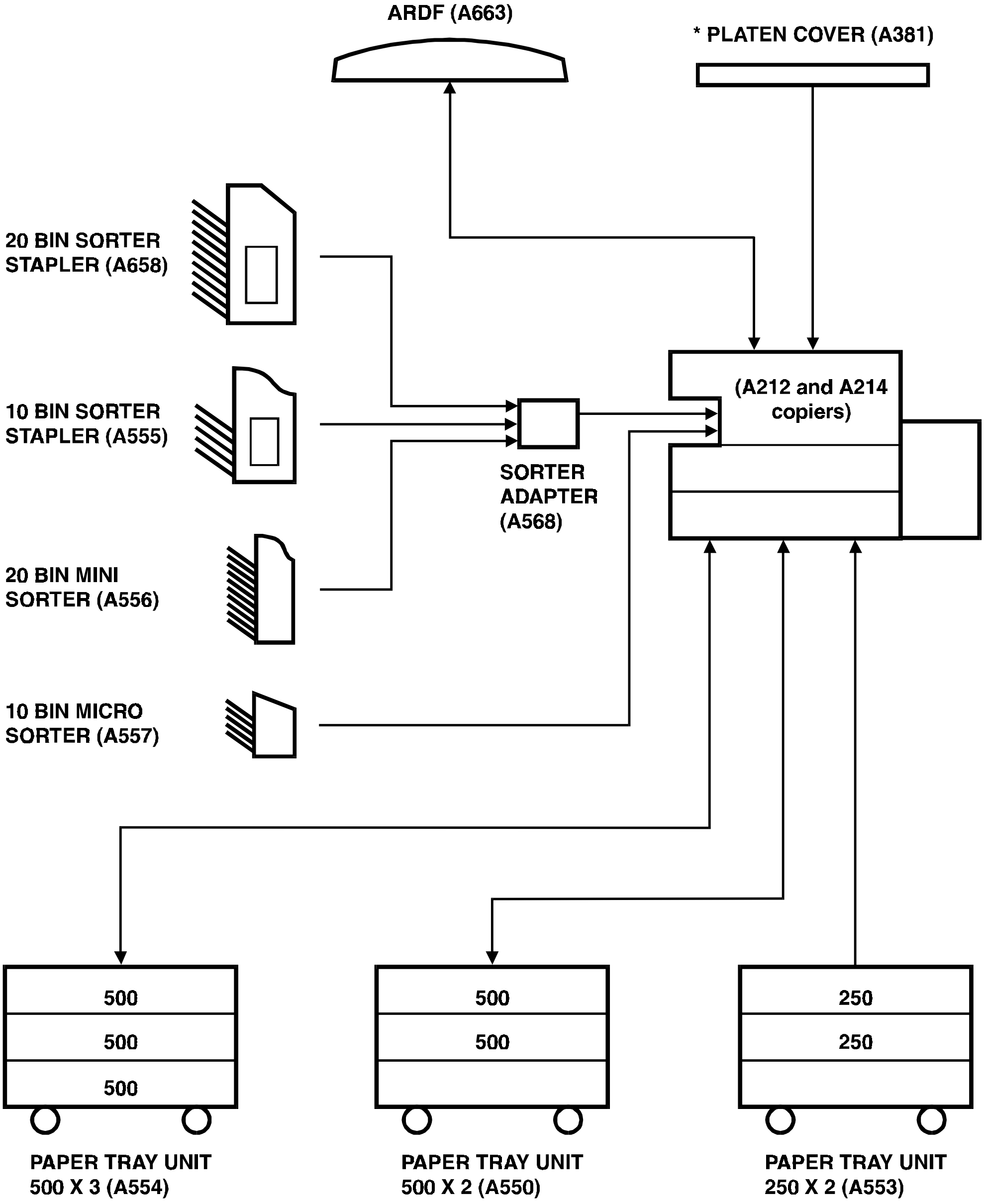
– A214 copier –

A 500-sheet tray
A duplex tray
A 1000-sheet large capacity tray


Duplex Tray
500-sheet tray
1,000 sheet large capacity tray

A212V501.wmf

2.2 OPTIONAL EQUIPMENT


ARDF (A663)
* PLATEN COVER (A381)
20 BIN SORTER STAPLER (A658)
10 BIN SORTER STAPLER (A555)
SORTER ADAPTER (A568)
(A212 and A214 copiers)
20 BIN MINI SORTER (A556)
10 BIN MICRO SORTER (A557)
500
500
500
500
500
250
250
PAPER TRAY UNIT 500 X 3 (A554)
PAPER TRAY UNIT 500 X 2 (A550)
PAPER TRAY UNIT 250 X 2 (A553)

A212V502.wmf

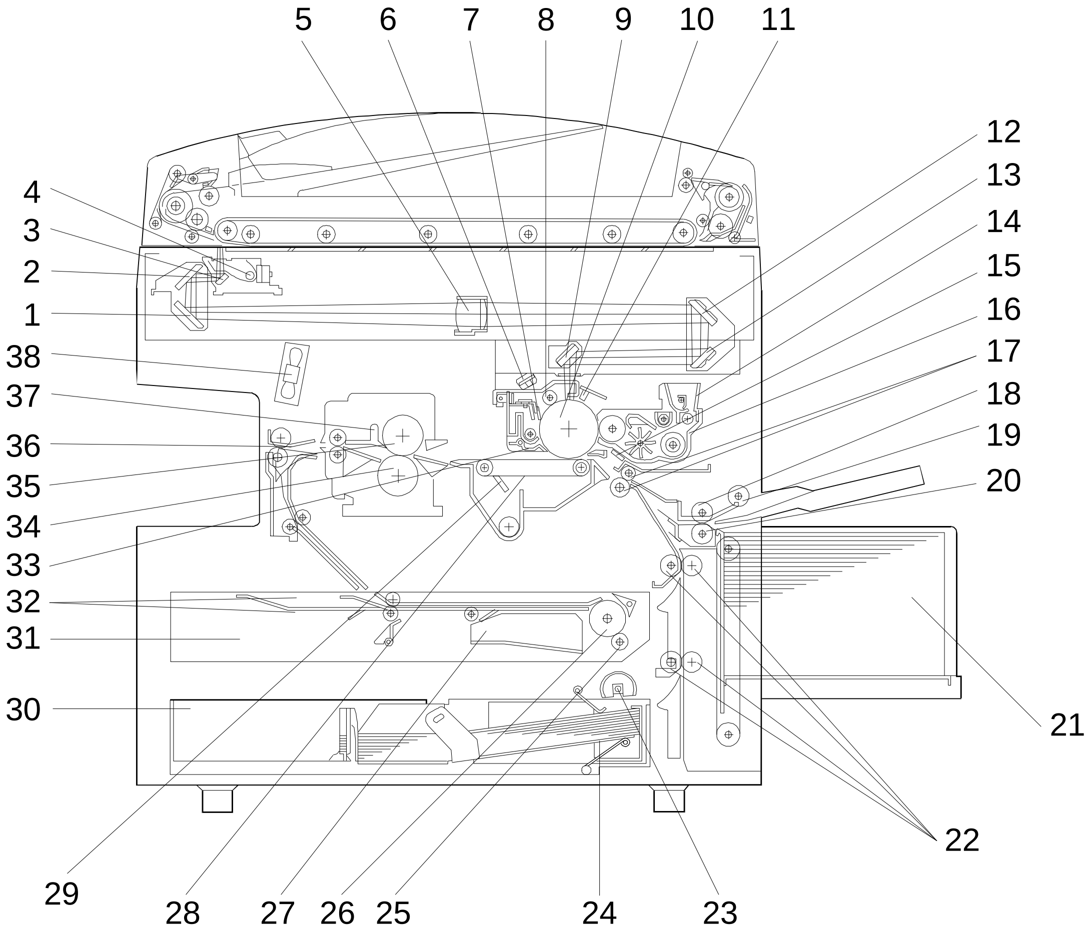
*: Except for machines with A212 destination code 29.

MEMO

3. MECHANICAL COMPONENT LAYOUT

– A214 copier –

NOTE: The paper feed area has been changed.


5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
4
3
2
1
38
37
36
35
34
33
32
31
30
21
22
29
28
27
26
25
24
23

A212V503.wmf

NOTE: The A212 copier is the same as the A214 copier except that the A212 does not have a duplex tray or an LCT.

1. 3rd Mirror
2. 2nd Mirror
3. 1st Mirror
4. Exposure Lamp
5. Lens
6. Quenching Lamp
7. Drum Cleaning Blade
8. Drum Charge Roller
9. 6th Mirror
10. OPC Drum
11. Erase Lamp
12. 4th Mirror
13. 5th Mirror
14. Toner Supply Unit
15. Pre-transfer Lamp
16. Development Unit
17. Registration Rollers
18. Feed Roller
19. Pick-up Roller
20. Separation Roller
21. Large Capacity Tray
22. Vertical Transport Rollers
23. Paper Feed Roller
24. Friction Pad
25. Duplex Friction Roller
26. Duplex Feed Roller
27. Jogger Fence
28. Transfer Belt
29. Transfer Belt Cleaning Blade
30. Lower Paper Tray
31. End Fence
32. Entrance Rollers
33. Pick-off Pawls
34. Pressure Roller
35. Hot Roller
36. Junction Gate
37. Hot Roller Strippers
38. Exhaust Fan

4. ELECTRICAL COMPONENT DESCRIPTIONS

Refer to the electrical component layout and the point to point diagram on the waterproof paper in the pocket for symbols and index numbers.

Symbol	Name	Function	Index No.
Printed Circuit Boards			
PCB1	Main Control	Controls all copier functions both directly or through other control boards.	13
PCB2	AC Drive	Provides ac power to the exposure lamp and fusing lamps.	11
PCB3	DC Power Supply	Provides dc power.	10
PCB4	Main Motor Control	Controls the rotation of the main motor.	83
PCB5	CB High Voltage Supply	Supplies high voltage to the drum charge roller and development roller.	1
PCB6	T High Voltage Supply	Supplies high voltage to the transfer belt.	49
PCB7	Operation Panel	Controls the LED matrix, and monitors the key matrix.	3
PCB8	Noise Filter (220 ~ 240 V machines only)	Removes electrical noise.	7
PCB9	Duplex Control (A214 machine only)	Controls the operation of the duplex tray.	57
PCB10	LCT Interface (A214 machine only)	Interfaces the LCT control signal between the main board and the LCT.	88
Motors			
M1	Main	Drives the main unit components.	77
M2	Toner Bottle Drive	Rotates the toner bottle to supply toner to the toner supply unit.	73
M3	LCT Lift (A214 machine only)	Lifts up and lowers the LCT bottom plate.	85
M4	Optics Cooling Fan 1	Removes heat from the optics unit.	81
M5	Exhaust Fan 1	Removes the heat from around the fusing unit.	78
M6	Scanner Drive	Drives the 1st and 2nd scanners (dc stepper motor).	80
M7	3rd Scanner Drive	Drives the 3rd scanner (dc stepper motor).	72
M8	Lens Vertical Drive	Shifts the lens vertical position.	76
M9	Lens Horizontal Drive	Shifts the lens horizontal position.	71
M10	Duplex Feed (A214 machine only)	Drives the feed roller and moves the bottom plate up and down.	52
M11	End Fence Jogger (A214 machine only)	Drives the end fence jogger to square the paper stack.	55
M12	Side Fence Jogger (A214 machine only)	Drives the side fence jogger to square the paper stack.	54

Symbol	Name	Function	Index No.
Sensors			
S1	By-pass Feed Paper Width	Informs the CPU what width paper is in the by-pass feed table.	25
S2	By-pass Feed Paper End	Informs the CPU that there is no paper in the by-pass tray.	28
S3	Upper Tray Paper End (A212 machine only)	Informs the CPU when the upper paper tray runs out of paper.	45
S4	Upper Relay	Detects the leading edge of paper from the upper tray to determine the stop timing of the upper paper feed clutch, and detects misfeeds.	93
S5	Lower Tray Paper End	Informs the CPU when the lower paper tray runs out of paper.	46
S6	Lower Relay	Detects the leading edge of paper from the lower paper tray to determine the stop timing of the lower paper feed clutch, and detects misfeeds.	92
S7	LCT Lower Limit (A214 machine only)	Sends a signal to the CPU to stop lowering the LCT bottom plate.	86
S8	LCT Paper End (A214 machine only)	Informs the CPU when the LCT runs out of paper.	87
S9	LCT Upper Limit (A214 machine only)	Sends a signal to the CPU to stop lifting the LCT bottom plate.	26
S10	Registration	Detects the leading edge of the copy paper to determine the stop timing of the paper feed clutch, and detects misfeeds.	27
S11	Image Density (ID)	Detects the density of various patterns on the drum during process control.	44
S12	Toner Density (TD)	Detects the toner concentration inside the development unit.	47
S13	Lens Horizontal HP	Informs the CPU that the lens is at the horizontal home position.	34
S14	Lens Vertical HP	Informs the CPU that the lens is at the full-size position.	19
S15	Scanner HP	Informs the CPU when the 1st and 2nd scanners are at the home position.	14
S16	3rd Scanner HP	Informs the CPU when the 3rd scanner is at the home position.	23
S17	Original Length-2	Detects the length of the original. This is one of the APS (Auto Paper Select) sensors.	20
S18	Fusing Exit	Detects misfeeds.	39
S19	Platen Cover	Informs the CPU whether the platen cover is up or down (related to APS/ARE functions). ARE: Auto Reduce and Enlarge	15

Symbol	Name	Function	Index No.
S20	Toner End	Instructs the CPU to add toner to the toner supply unit, and detects toner end conditions.	48
S21	Transfer Belt Contact HP	Informs the CPU of the current position of both the transfer belt unit and the drum charge roller unit.	22
S22	Auto Image Density (ADS Sensor)	Detects the background density of each original in ADS mode.	12
S23	Original Width	Detects the width of the original. This is one of the APS (Auto Paper Select) sensors.	38
S24	Original Length-1	Detects the length of the original. This is one of the APS (Auto Paper Select) sensors.	18
S25	Duplex Paper End (A214 machine only)	Detects paper in the duplex tray.	50
S26	Duplex Turn (A214 machine only)	Detects the trailing edge of the copy paper to determine the jogging timing, and detects misfeeds.	51
S27	Duplex Entrance (A214 machine only)	Detects misfeeds.	56
S28	Side Fence Jogger HP (A214 machine only)	Detects the home position of the duplex side fence jogger.	53
S29	End Fence Jogger HP (A214 machine only)	Detects the home position of the duplex end fence jogger.	58
S30	Original Length (Option for N. American models)	Detects original length for 11" x 15" paper.	21
Switches			
SW1	By-pass Feed Table	Detects whether the by-pass feed table is open or closed.	30
SW2	Tray Down (A214 machine only)	Sends a signal to the CPU to lower the LCT bottom plate.	90
SW3	Upper Tray Paper Size (A212 machine only)	Determines what size of paper is in the upper paper tray, and detects when the tray has been closed. ✻ The upper tray switch has been eliminated.	24
SW4	Lower Tray Paper Size	Determines what size of paper is in the lower paper tray, and detects when the tray has been closed. ✻ The lower tray switch has been eliminated.	31
SW5	Vertical Guide Set (A212 machine only)	Detects whether the vertical guide is open or not.	29

Symbol	Name	Function	Index No.
SW6	LCT Cover-1 (A214 machine only)	Detects whether the LCT cover is open or not.	91
SW7	LCT Cover-2 (A214 machine only)	Cuts the dc power line of the LCT lift motor.	89
SW8	Main	Supplies power to the copier.	37
SW9	Front Cover Safety	Cuts the ac power line and detects whether the front door is open or not.	36
SW10	Exit Cover Safety (A214 machine only)	Cuts the ac power line and detects whether the exit cover is open or not.	42
Magnetic Clutches			
CL1	Toner Supply	Turns the toner supply roller to supply toner to the development unit.	66
CL2	Development	Drives the development roller.	65
CL3	Transfer Belt Contact	Controls the touch and release movement of both the transfer belt unit and the drum charge roller unit.	82
CL4	Registration	Drives the registration rollers.	67
CL5	By-pass Feed	Starts paper feed from the by-pass feed table or LCT.	68
CL6	Relay	Drives the relay rollers.	70
CL7	Upper Paper Feed (A212 machine only)	Starts paper feed from the upper paper tray.	74
CL8	Lower Paper Feed	Starts paper feed from the lower paper tray.	75
Solenoids			
SOL1	A214 machine: LCT/By-Pass Pick-up Solenoid A212 machine: By-pass Pick-up Solenoid	Picks paper up from the by-pass feed table. When paper is fed from the LCT, this solenoid assists SOL3.	69
SOL2	Junction Gate (A214 machine only)	Moves the junction gate to direct copies to the duplex tray or to the paper exit.	79
SOL3	LCT Pick-up (A214 machine only)	Picks up paper from the LCT.	84
Lamps			
L1	Exposure	Applies high intensity light to the original for exposure. ✻ Modified - see the "Optics" section for details.	16
L2	Main Fusing	Provides heat to the central area of the hot roller. ✻ Modified - see the "Fusing" section for details.	59

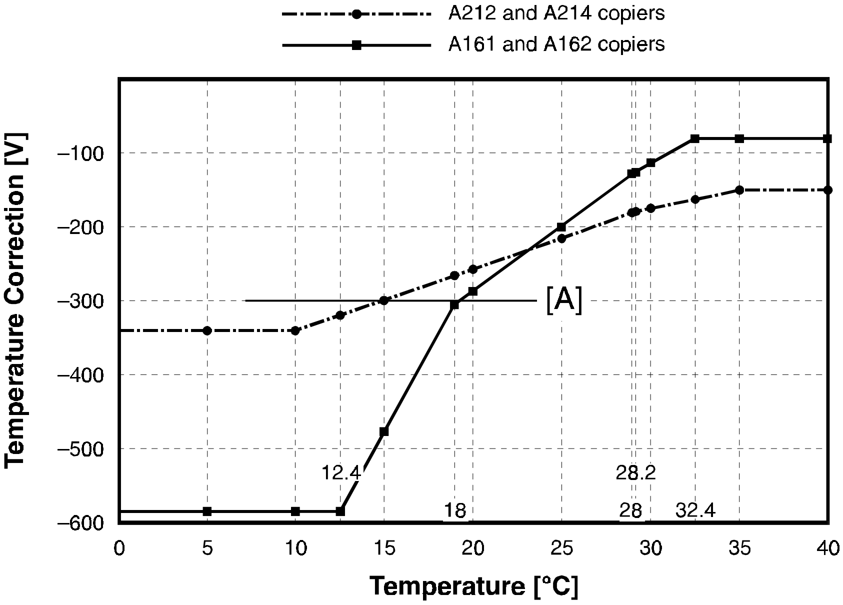
Symbol	Name	Function	Index No.
L3	Secondary Fusing	Provides heat to both ends of the hot roller. ✻ Modified - see the "Fusing" section for details.	60
L4	Pre-transfer	Reduces the charge remaining on the drum surface before transfer.	4
L5	Quenching	Neutralizes any charge remaining on the drum surface after cleaning.	5
L6	Erase	After exposure, this eliminates the charge on areas of the drum that will not be used for the image.	2
Heaters			
H1	Drum	Turns on when the main switch is off to keep the temperature around the drum charge roller at a certain level. Also prevents moisture from forming around the drum.	33
H2	Optics Anti-condensation (option)	Turns on when the main switch is off to prevent moisture from forming on the optics.	40
H3	Lower Tray (option)	Turns on when the main switch is off to keep paper dry in the lower paper tray.	32
Thermistors			
TH1	Main Fusing	Monitors the temperature at the central area of the hot roller.	63
TH2	Secondary Fusing	Monitors the temperature at the ends of the hot roller.	64
TH3	Optics	Monitors the temperature of the optics cavity.	41
TH4	Drum Charge	Monitors the temperature of the drum charge roller.	43
Thermofuses			
TF1	Main Fusing	Provides back-up overheat protection in the fusing unit.	62
TF2	Secondary Fusing	Provides back-up overheat protection in the fusing unit.	61
TF3	Exposure Lamp	Opens the exposure lamp circuit if the 1st scanner overheats.	17
Counters			
CO1	Total	Keeps track of the total number of copies made.	35

Symbol	Name	Function	Index No.
CO2	Key (option)	Used for control of authorized use. The copier will not operate until it is installed.	N/A
Others			
CB1	Circuit Breaker (220 ~ 240 V machines only)	Provides back-up high current protection for electrical components.	8
TR1	Transformer (220 ~ 240 V machines only)	Steps down the wall voltage to 100 Vac.	6
CC1	Choke Coil	Removes high frequency current.	9

5. PROCESS CONTROL

✻ Refer to the A204/A206/A207/A208/A210/A211 service manual for detailed information.

5.1 TEMPERATURE CORRECTION



A212D500.wmf

✻ Temperature correction has changed, as explained below. Also, the machine no longer performs drum rotation time correction.

The new drum charge roller needs only about half the correction voltage that was needed in the base copier. Further, the level of correction needed for the lowest temperature point (5°C) is about the same as the normal room temperature point for the base copier [A].

In the base machine, rotation time correction was only needed for low temperatures where the temperature correction was large. In the new machines, the temperature correction is never greater than –300 V, so the rotation time correction has been eliminated.

- Temperature Correction (Copying) - Base drum charge voltage = –1,500 V
- Temperature Correction (VSP Pattern) - Base drum charge = –1,370 V

Drum Charge Roller Temperature (°C)	Temperature Correction	
	VSP Pattern	Copying
35.0 ≤ T	0	–150.0
28.0 ≤ T < 35.0	–200.0 + 5.7T	–300.0 + 4.3T
10.0 ≤ T < 28.0	–320 + 10.0T	–428.9 + 8.9T
T < 10.0	–220.0	–340.0

6. DRUM

NOTE: The drum in this machine is the same as the A204/A206/A207/A208/A210/A211 copiers. Please refer to the A204/A206/A207/A208/A210/A211 manual for details.

7. OPTICS

7.1 OVERVIEW

7.1.1 Toner Shield Glass

✻ The shield glass by the green filter above the drum has been removed (it is no longer needed).

7.2 SCANNER DRIVE

✻ The returning speed of the first scanner has changed to 1,000 (mm/s).

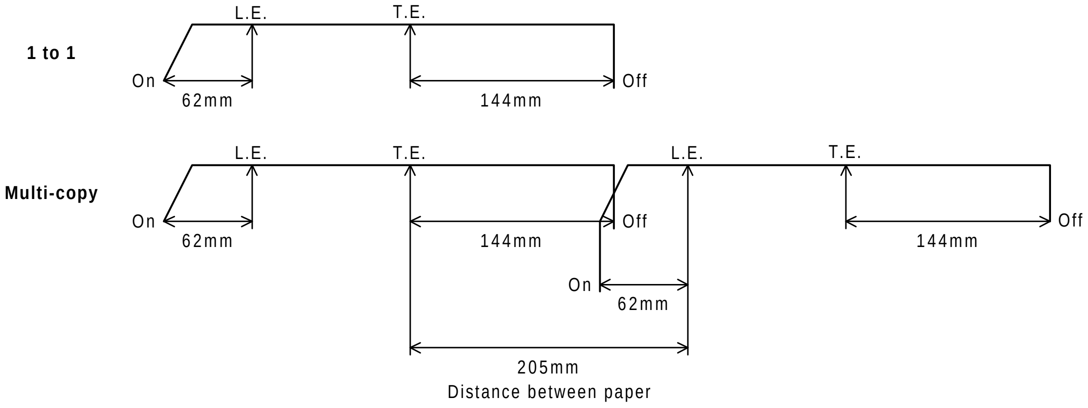
8. DEVELOPMENT CLUTCH ON/OFF TIMING

The development clutch ON/OFF timing has been changed to prolong the life of the developer. The life of the developer has been increased from 100 k to 120 k.

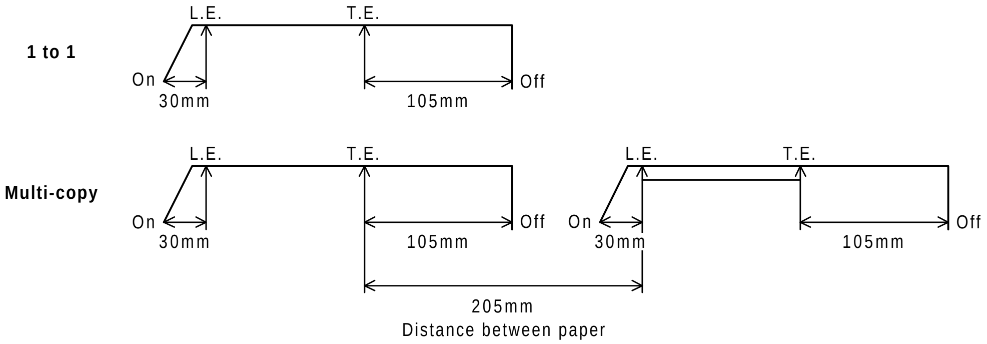
	Development Clutch ON Time (s)		Reducation
	A161/A162 copiers	A212/A214 copiers	
1 to 1	2.77	2.30	83%
1 to 2	5.54	4.60	83%

8.1 Development Clutch On-Off Timing

- A161/A162 -


L.E.
T.E.
1 to 1
On
62mm
144mm
Off
L.E.
T.E.
L.E.
T.E.
Multi-copy
On
62mm
144mm
Off
144mm
Off
On
62mm
205mm
Distance between paper

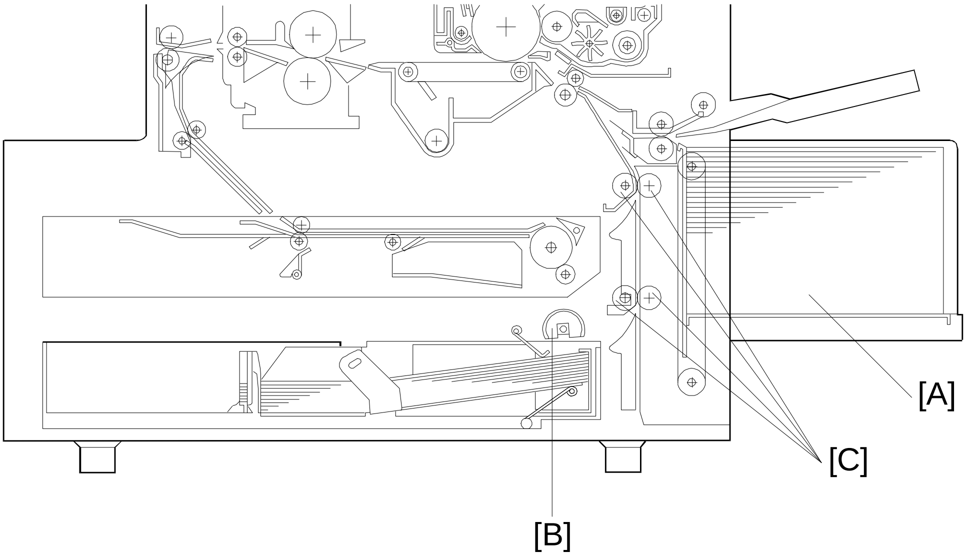
- A212/A214 -


L.E.
T.E.
1 to 1
On
30mm
105mm
Off
L.E.
T.E.
L.E.
T.E.
Multi-copy
On
30mm
105mm
Off
On
30mm
105mm
Off
205mm
Distance between paper

A212D507.wmf

9. PAPER FEED AND REGISTRATION

9.1 OVERVIEW



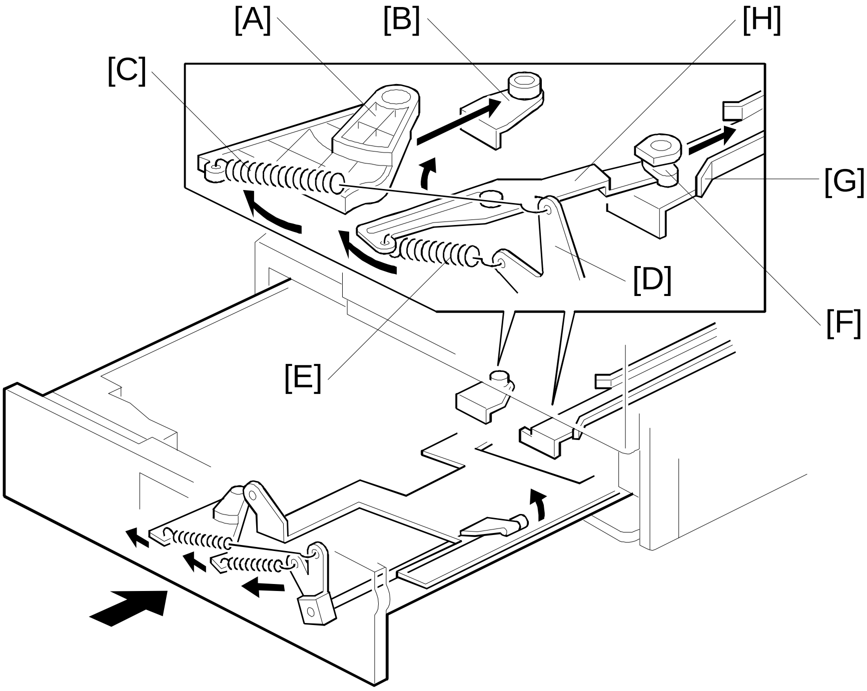
A212D503.wmf

The paper feed station uses a paper tray [A] which can hold 500 sheets.

The paper tray uses semicircular feed rollers [B] and a corner separator. The semicircular feed rollers make one rotation to drive the top sheet of the paper stack to the relay rollers [C]. The paper tray has two corner separators, which allow only one sheet to feed. They also hold the paper stack. When the paper tray is drawn out of the machine, the spring pressure is released, and the tray bottom plate drops. In addition, there is no need to press the bottom plate down when putting the tray back in.

9.2 PAPER TRAY FEED

9.2.1 Paper Lift Mechanism

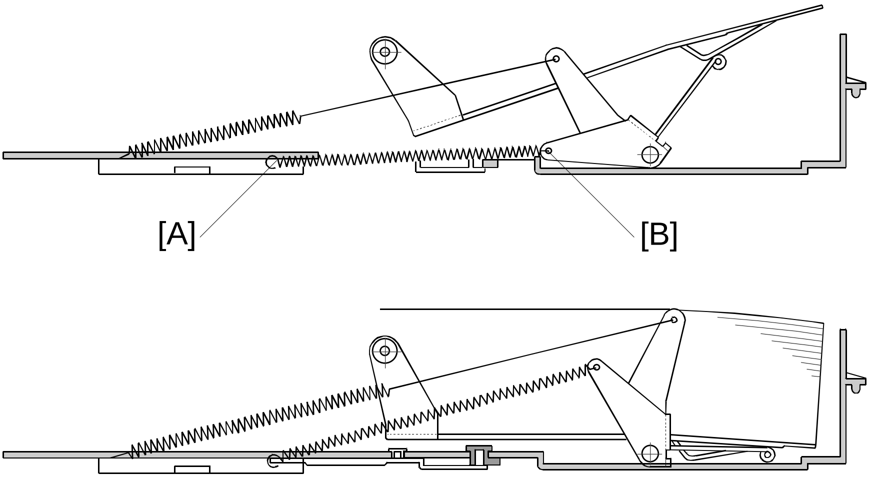


A212D501.wmf

The capacity of this tray is greater than usual for a corner separator type. Because of this, there are two springs to lift the bottom plate.

As the tray is pushed into the machine, shutter [A] under the tray pushes against projection [B]. As the shutter slides past the projection, the shutter rotates, which forces the main lift spring [C] to pull the bottom plate lever [D]. The secondary lift spring [E] also pulls the bottom plate lever (this is described below).

To apply spring tension for wider paper, projection [F] stops against the end of rail [G]. When this occurs, lever [H] swings out in the direction shown above, which stretches the spring as the tray is pushed in. The side fence position affects the orientation of [F]; wider paper causes [F] to contact [G] earlier, leading to greater spring tension when the tray has been pushed all the way in.



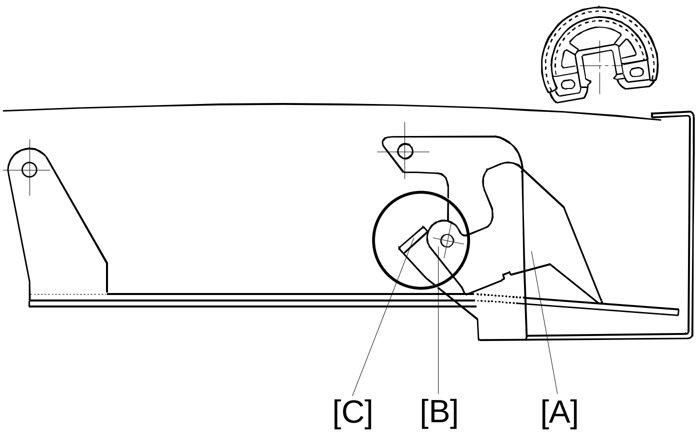
A212D504.wmf

The paper tray capacity has been increased from 250 to 500 sheets and the paper lift mechanism differs from former one.

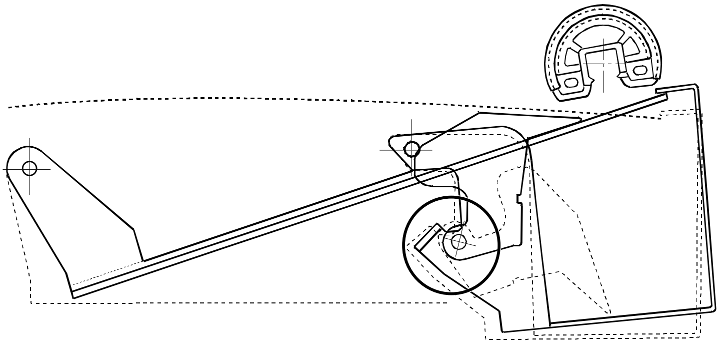
Force is applied to the bottom plate by the main lift spring and the secondary lift spring, depending on the amount of paper remaining in the tray.

When one sheet remains in the tray, the bottom plate is supported only by the main lift spring. In this case, the secondary lift spring does not affect the bottom plate, because both ends [A], [B] of the secondary lift spring and the fulcrum of bottom plate lever line up in a straight line. As the amount of paper increases, the bottom plate lever inclines right, and tension for the both main lift spring and secondary lift spring increase.

9.3 Corner Separator Over Rising Prevention Mechanism



A212D505.wmf



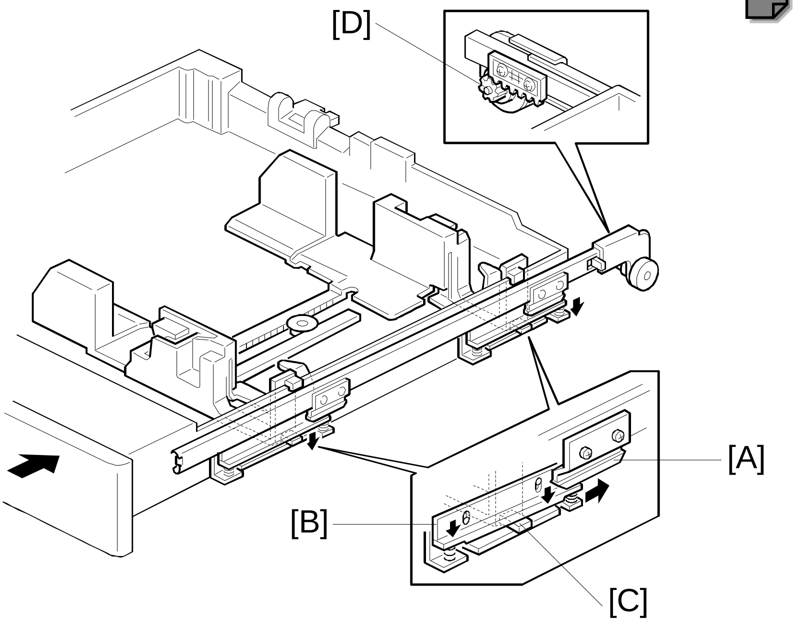
A212D506.wmf

The bottom plate stopper [A] prevents the corner separator from rising too high.

When the tip of bottom plate stopper touches the bottom plate by the weight of stopper itself, point [B] on the bottom plate stopper contacts [C] on the corner separator. This prevents the corner separator from over-rising.

The shape of contact point [B] adjusts the distance between the corner separator and bottom plate according to the amount of paper.

9.4 Corner Separator Stopper Mechanism



A212D502.wmf

The corner separator stopper prevents the corner separator from dislocation when the tray holds a lot of paper.
When the paper tray is pushed into the machine, the stopper holder [A] slides to press the corner separator stopper [B] down. The corner stopper holds down portion [C], immobilizing the corner separator.
Damper [D] at the end of the right guide rail absorbs shock, when the tray is pushed in.

10. INSTALLATION

10.1 COPIER ACCESSORY CHECK

Check the accessories against the following list:

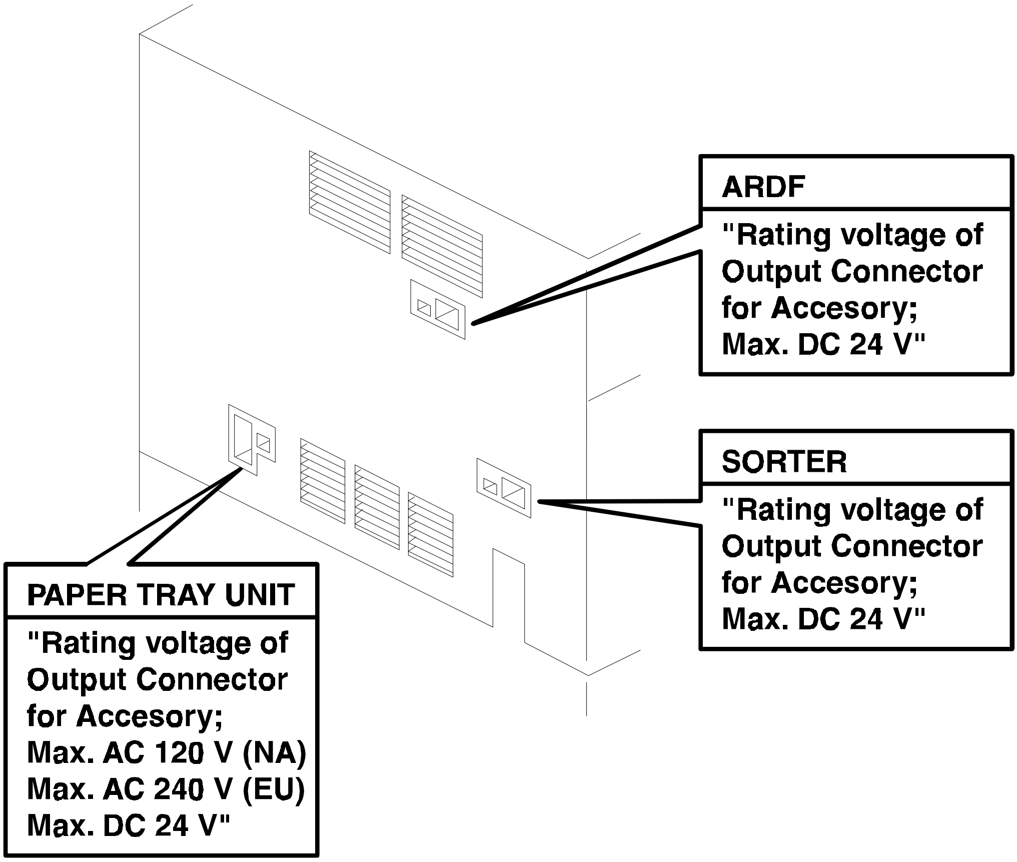
Description	Q’ty
1. Paper Size Decal	1
2. Symbol Explanation Decal	1
3. Optional Margin Adjustment Function Decal	1
4. Combine Originals Explanation Decal	1
5. Receiving Tray	1
6. Operating Instructions (except for -27 machines)	1
7. User Survey Card (-17 machines only)	1
8. New Equipment Condition Report	1
9. Cushion	1

10.2 COPIER INSTALLATION PROCEDURE

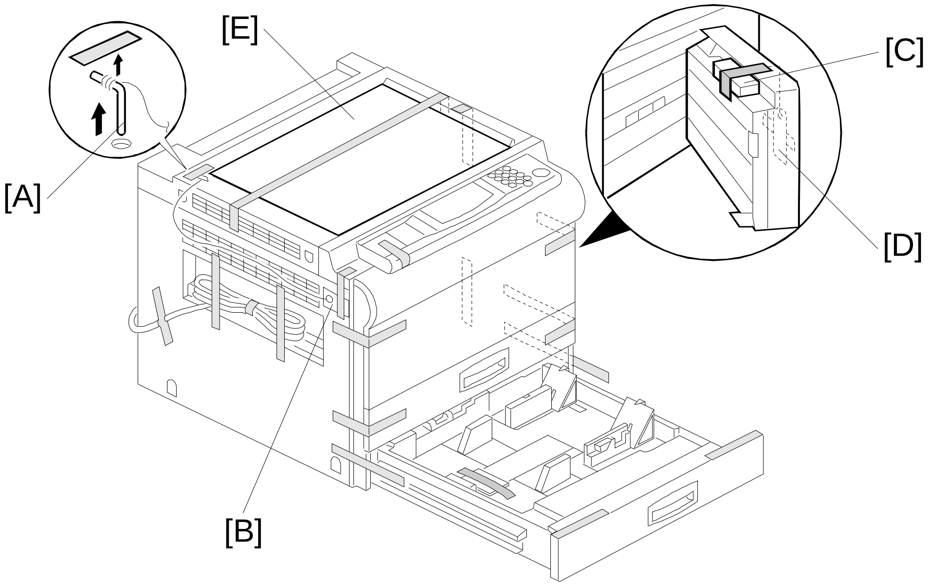
⚠CAUTION

Rating Voltage for Peripherals

Make sure to plug the cables into the correct sockets.

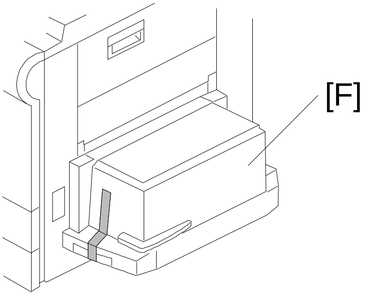

ARDF
"Rating voltage of Output Connector for Accesory; Max. DC 24 V"
SORTER
"Rating voltage of Output Connector for Accesory; Max. DC 24 V"
PAPER TRAY UNIT
"Rating voltage of Output Connector for Accesory; Max. AC 120 V (NA) Max. AC 240 V (EU) Max. DC 24 V"

A212I500.wmf



A212I514.wmf

- A214 copier -



A212I501.wmf

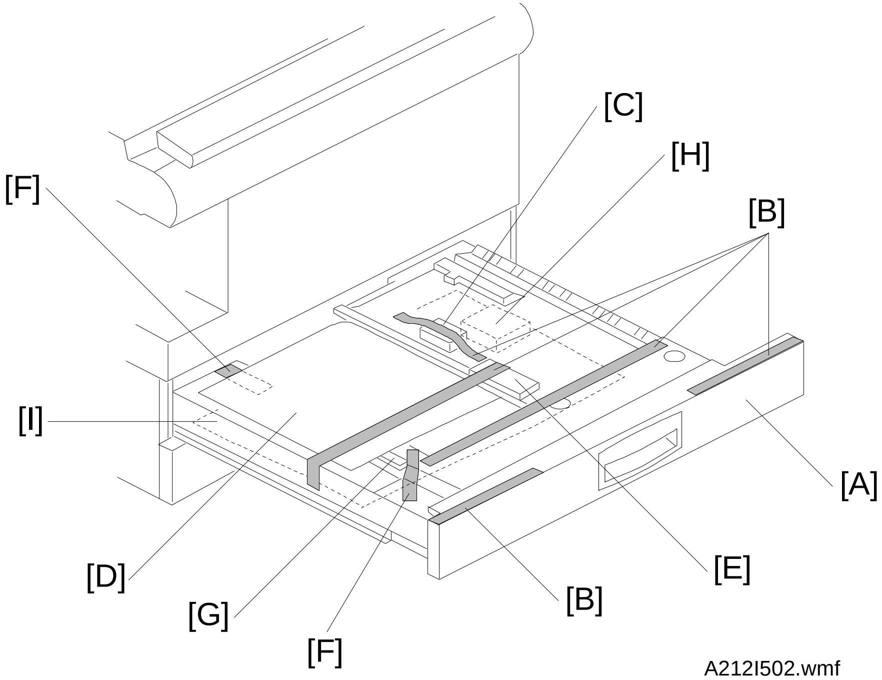
NOTE: 1) Never lift the machine by holding the LCT, or the LCT will break.

2) Keep the shipping retainers after installation. They will be reused if the machine is moved to another location.

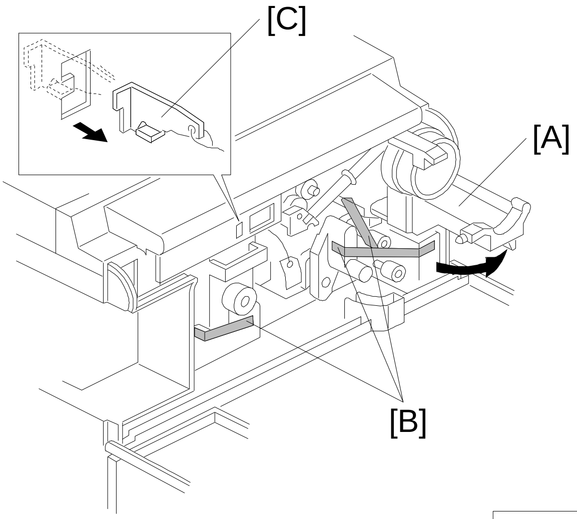
3) Proper reinstallation of the shipping retainers is required in order to avoid any transport damage. It is most important to put back the scanner lock pin when transporting this copier. If not, skewed image may result.

1. Remove the scanner lock pin [A] and red tag [B], as shown.
2. Remove the cushion [C] and red tag [D], as shown.
3. Remove the strips of tape and the sheet of paper [E]. Also, for A214 copier remove the strip of tape on the LCT [F].
4. Pull out the paper tray [G], and remove the strips of tape and the bottom plate stoppers [H]. Then install the paper tray in the copier (1 tray for duplex machines and 2 trays for non-duplex machines).

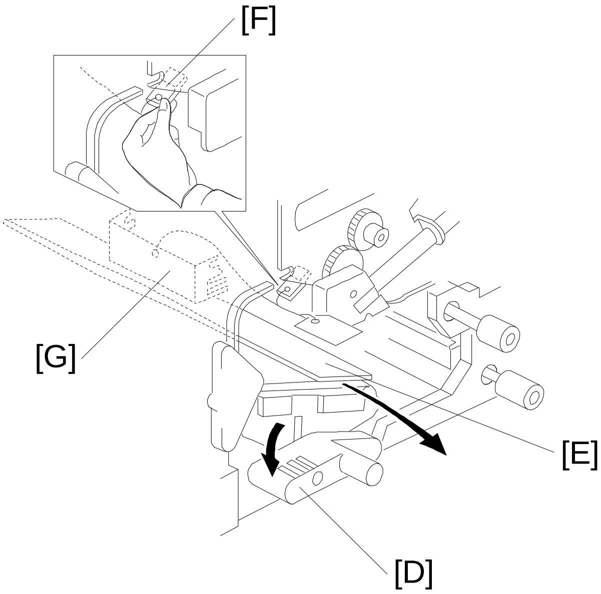
- A214 copier -



5. **A214 copier only:**
   1) Pull out the duplex tray [A] and remove the strips of tape [B].
   2) Remove the guide roller stopper [C] and a sheet of paper [D].
   3) Open the upper duplex guide plate [E] and remove the strips of tape [F].
   4) Open the lower duplex guide plate [G], and remove the styrofoam support [H] and the sheet of paper [I].
   5) Install the duplex tray in the copier.

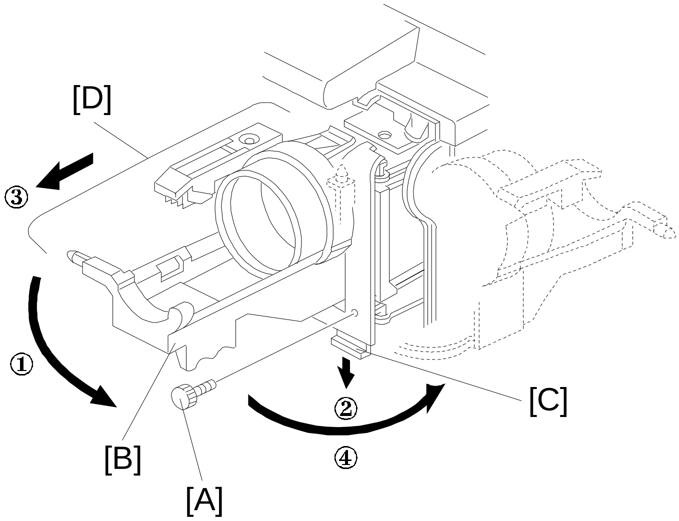


A212I515.wmf

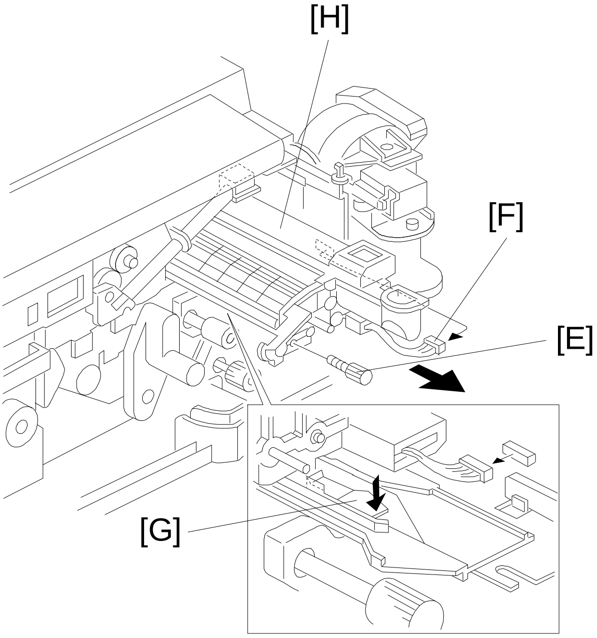


A212I503.wmf

6. Open the front cover and swing out the toner bottle holder [A].
7. Remove the strips of tape [B].
8. Remove the switch actuator lock bracket [C] as shown.
9. Turn the "A1" lever [D] counterclockwise to lower the transfer belt unit. Then remove the cushion sheet [E].
10. Remove the blade release wedge [F] together with the pick off pawl release mylar [G].
11. Return the "A1" lever to the set position.

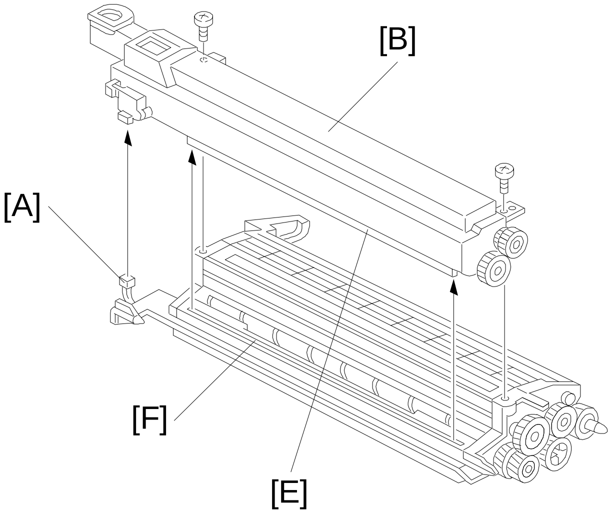


A212I504.wmf

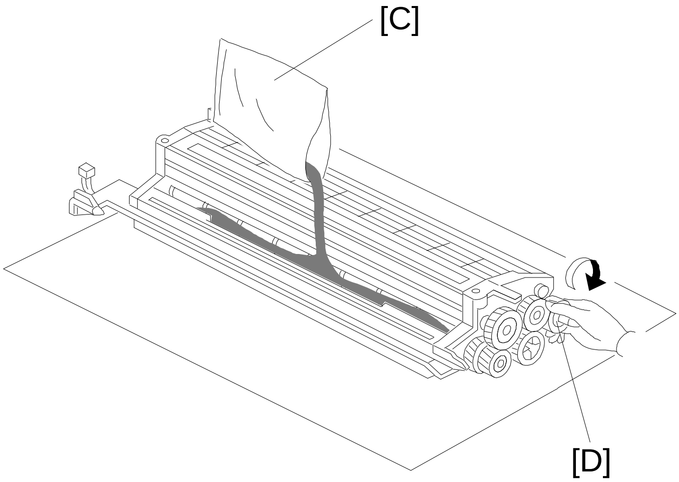


A212I505.wmf

12. Remove the knob screw [A].
13. ① Swing out the bottle holder [B] and ② pull down the lock lever [C]. ③ Then slide out the bottle holder assembly [D] and ④ swing out the bottle holder assembly [D].
14. Remove the knob screw [E] and disconnect the white connector [F].
15. Pull down the development unit lock lever [G] from under the plate and pull out the development unit [H]. Then place it on a clean sheet of paper.



A212I506.wmf



A212I507.wmf

16. Disconnect the connector [A] and separate the toner supply unit [B] from the development unit (2 screws).

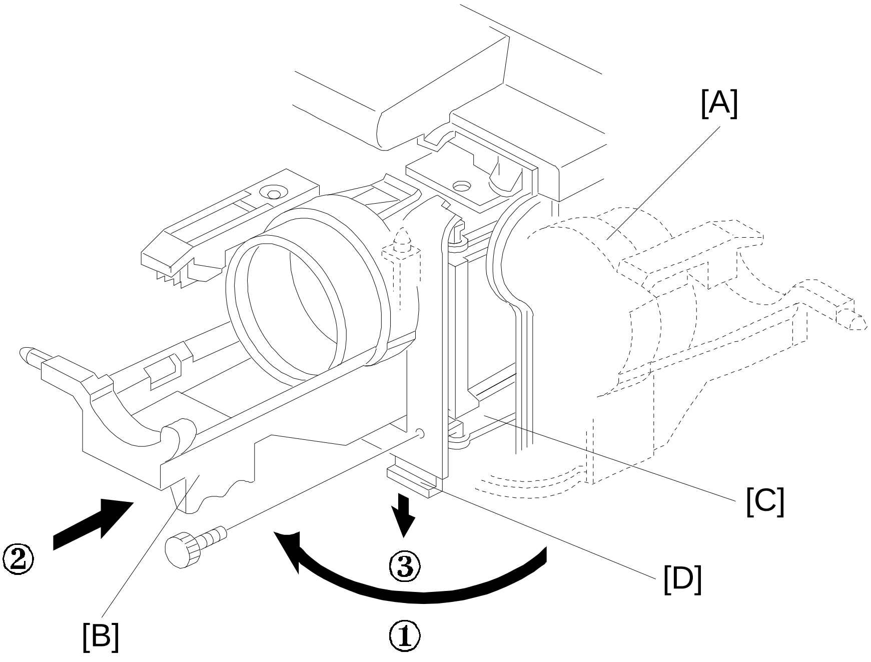
17. Pour about half a pack of developer [C] into the development unit. Then rotate the outer gear [D] as shown to distribute the developer evenly. Then pour in all the remaining developer and rotate the gear again.

    NOTE: To prevent the developer from spilling, do not rotate the gears in the other direction.

18. Remount the toner supply unit on the development unit (2 screws) and connect the white connector.

    NOTE: Make sure that the positioning rib [E] sits in the groove [F].

19. Install the development unit in the copier (1 knob screw and 1 connector).

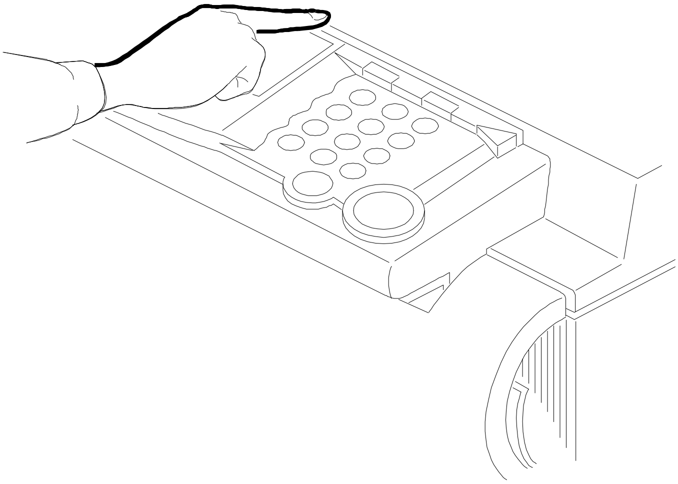


A212I508.wmf

IMPORTANT: Do not swing the bottle holder fully into the machine before step 20.

20. Swing in the bottle holder assembly [A] so that the toner bottle holder [B] and the slide rail [C] are aligned properly.
21. Slide the bottle holder assembly in as described below:
    1) Slide the bottle holder assembly into its locked position while pressing down the bottle holder lock lever [D].
    2) When the bottle holder assembly reaches its locked position, push up the bottle holder lock lever so that the knob screw holes are aligned.
    3) Secure the bottle holder lock lever with the knob screw.

    NOTE: Do not swing the bottle holder assembly all the way into its original position in the machine without sliding and locking it into position exactly as described above. Otherwise, the assembly will be damaged.
22. Install a toner bottle by following the instructions placed on the reverse side of the front cover.
23. Swing in the toner bottle holder to its original position and close the front cover.
24. Plug in the copier and turn on the main switch.



A212I509.wmf

25. Enter SP mode as follows:
    1) Press the [◈/◎] key.
    2) Enter "107" using the numeric keys.
    3) Hold down the [C/◎] key for more than 3 seconds.

    NOTE: When SP mode is selected, "1" blinks in the 3rd digit of the copy counter, the Auto Image Density indicator starts blinking, and the reduce/enlarge indicator turns off.

26. Perform the "TD sensor initial setting" SP mode as follows:
    1) Enter "2" and press the [R/#] key.
    2) Enter "214" and press the [R/#] key.
    3) Press the [◇] key.

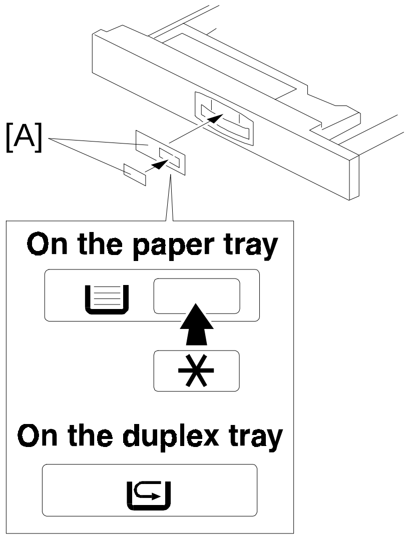
    NOTE: The machine will automatically stop when TD sensor initial setting is completed. (It takes about 2.5 minutes.)

    Then perform the "Compulsory toner supply" SP mode as follows:
    1) Press the [◈/◎] key twice.
    2) Enter "2" and press the [R/#] key.
    3) Enter "207" and press the [R/#] key.
    4) Press the [◇] key.

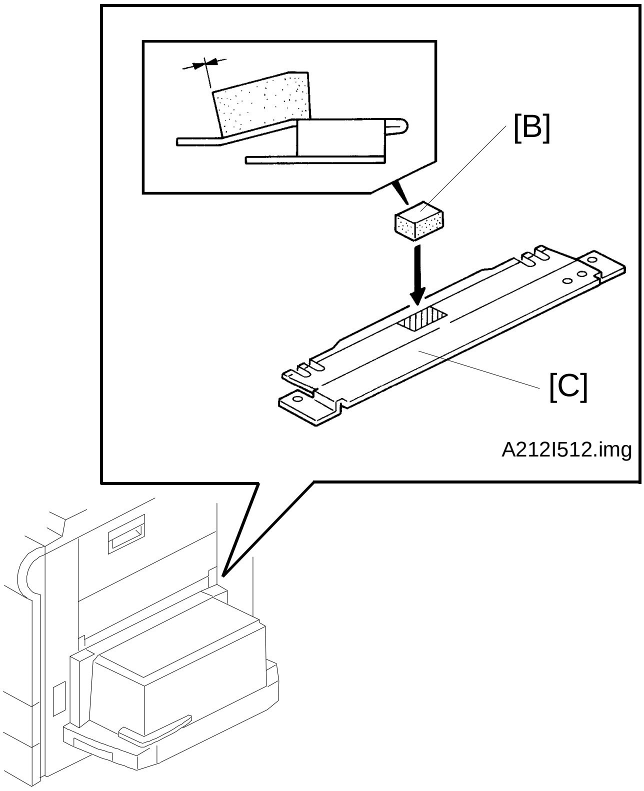
    NOTE: The machine will automatically stop when compulsory toner supply is completed. (It takes about 30 seconds.)

    5) Compulsory toner supply must be performed twice in order to supply enough toner to the toner hopper, so press the [◇] key again.

27. Press the [◈/◎] key three times to exit SP mode.



A212I510.wmf



A212I512.img

A212I511.wmf

28. Pull out the paper tray and load paper into it. (The paper size and direction for each tray should be as specified by the customer.)

    NOTE: The side and rear fences should be properly positioned.

29. Select the appropriate paper size for the paper trays in the main body by sliding the paper size slider into the correct position (see section 2.3.2 in the base copier manual, "Paper size selection for the copier paper trays" for details).

30. **When a paper tray unit is installed:** Enter the proper paper size for each paper tray by following the procedure shown in section 2.3 in the base copier manual, "Paper Size Selection" and in "Service Tables - SP5-019: Paper Size Setting".

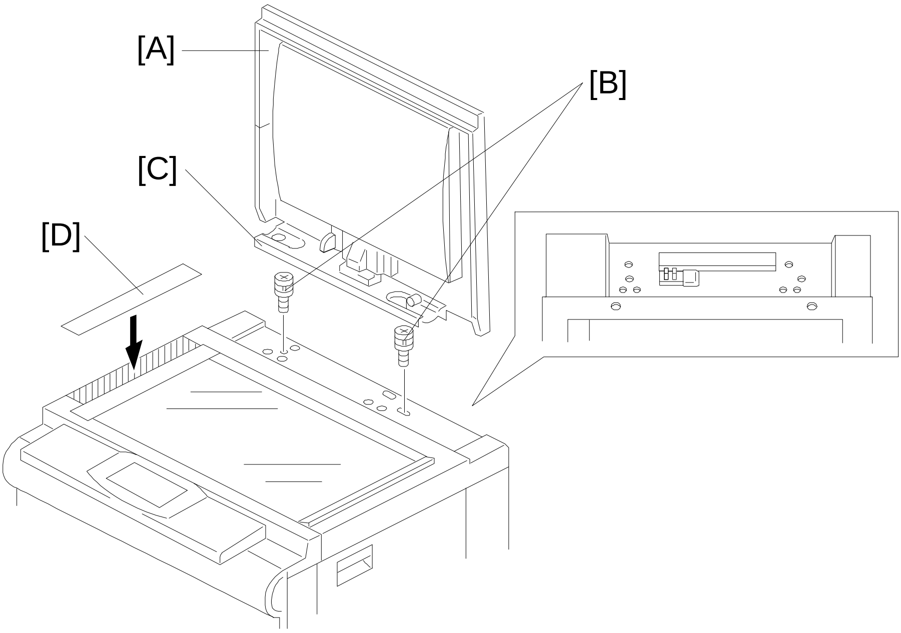
31. Load paper into the paper trays and the copy tray.

32. Attach the appropriate paper size decals [A] to the paper trays.
    For the A214 copier, attach the duplex decal to the duplex tray.

    NOTE: Paper size decals are used also for the paper tray unit. Save the remaining decals for use with the paper tray unit.

33. Attach the cushion [B] at the center of the LCT upper stay [C] as shown.

    NOTE: Make sure that the edge of the cushion is aligned with the line where the stay is bent at a slight angle.



A212I513.wmf

34. Install the optional platen cover [A] if necessary:
    1) Install 2 stud screws [B] on the top cover as shown.
    2) Position the platen cover bracket [C] on the stud screws and slide it to the left.
35. Attach the symbol explanation decal [D] to the top cover as shown. (If the ARDF will be installed, stick the decal on the ARDF exit cover. Refer to the ARDF installation procedure.)
36. Check the copy quality and machine operation.

10.3 AUTO REVERSE DOCUMENT FEEDER (A663)

✻ Refer to the A204/A206/A207/A208/A210/A211 service manual for detailed information.

10.4 20-BIN SORTER STAPLER (A658)

✻ Refer to the A204/A206/A207/A208/A210/A211 service manual for detailed information.

11. SERVICE REMARKS

11.1 PAPER FEED

✻ Only the following item is new.

Always push the paper tray in gently. If the tray is slammed shut, the paper stack might go over the side fence or the corner separators, causing double feed or image skewing problems.

12. SERVICE PROGRAM MODE

12.1 SERVICE PROGRAM MODE TABLE

1. Items written in ***bold italic letters*** are newly added service programs.
2. Items written in **bold** are modified service programs from the A161/A162 copiers.
3. A "†" after the mode name means that copies can be made while in this SP mode.
4. A "‡" after the setting in the "Settings" column means that the actual factory setting for this is written on the data sheet in the front cover.
5. A "°" before the mode number means that this mode can be accessed by sales representatives (◈/◎ → C/◎ → ◈/◎ → ◈/◎).
6. A "•" before the mode number means that this mode can be accessed by users using a UP mode (◈/◎ → C/◎). See "UP Mode/SP Mode Cross Reference Table".
7. In the Function column, comments (extra information) are in italics.
8. In the Settings column, the default values are printed in bold letters.
9. "RDS" means Remote Diagnostic System (not available in these models) "CSS" means Customer Support System (only available in Japan)

12.1.1 Quick Reference

The following is a quick reference list of the SP Modes.

Mode No.	Function
Paper Feed/Paper Transport/Fusing	
1-001	Registration †
1-003-xxx	**Paper Feed Timing †**
1-008	Misfeed Detection †
1-103	**Fusing Idling †**
°1-104	Fusing Temperature Control †
1-105-xxx	**Fusing Temperature Adjustments †**
1-106-xxx	**Fusing Temperature Display †**
1-108	Forced Start †
1-801	Not used
1-902	Jogger Span Adjustment (Side Fence) †
1-905	Jogger Span Adjustment (End Fence) †
Around the Drum	
2-001	Drum Charge Voltage Adjustment (for copying)

Mode No.	Function
2-002-xxx	Drum Charge Voltage Display †
2-003	Drum Charge Voltage Adjustment (for making V_{SP} patterns)
2-101-xxx	**Leading/Trailing Edge Erase Margin Adjustment †**
2-201-xxx	Development Bias Adjustments †
2-203	**Development Bias Adjustment (for making V_{SP} patterns)**
2-206-xxx	Development Bias Display †
2-207	Forced Toner Supply (shown as "Compulsory Toner Supply" on the display)
2-208-001	Toner Supply Mode Selection †
2-208-002	Toner Supply Ratio (TD Sensor Supply Mode) †
2-208-003	**Toner Supply Ratio (Fixed Supply Mode) †**
2-214	TD Sensor Initial Setting
2-215-xxx	TD Sensor Output Display †
2-220	TD Sensor Initial Output Display †
2-222	Toner Supply Ratio (Detect Supply Mode) †
2-301-xxx	**Transfer Current Adjustments †** **Factory Use Only: Do not change the settings.**
2-801	Developer Agitation
2-802	Drum Charge Roller Temperature †
2-812	Drum Reverse Rotation Adjustment †
2-901	**Drum Charge Roller Cleaning Interval †**
2-902	Not used
Process Control	
3-001	ID Sensor Initial Setting
3-002	ID Sensor Initial Setting Display †
3-103-xxx	ID Sensor Output Display †
3-105	Forced V_L Detection
3-106	Initial V_{LP}/V_{LG} Display †
3-107	Current V_{LP}/V_{LG} Display †
3-111	**Current V_{RP}/V_{RG} Display †**
3-112	Forced V_R Detection
3-123	Drum Initialize
3-801	**Auto Process Control Mode Selection †**
3-901	Free Run (Exposure Lamp Off)
3-902	Forced Process Control
Optics	
4-001	Exposure Lamp Voltage Adjustment †
°4-002	Exposure Lamp Voltage Display †
4-008	Vertical Magnification Adjustment †
4-011-xxx	Lens Horizontal HP Adjustments †
4-013	Scanner Free Run
4-101	**Horizontal Magnification Adjustment †**

Mode No.	Function
4-102	Lens Error Correction †
4-103	Focus Adjustment †
4-201	Auto ADS Gain Adjustment
4-202	ADS Initial Gain Display †
4-203	ADS Actual Gain Display †
4-301	APS Sensor Function Check †
4-302	Optional APS Sensor **(LT version only)** †
4-303	APS A5/HLT Detection †
4-901	APS Size Priority (for F4 size) †
•°4-902	APS 8 k/16 k Detection **(A4 versions only)** †
Operation	
•°5-001	**All Indicators ON †**
•°5-002	Feed Station Priority Selection †
•°5-003	APS Priority Selection †
•°5-004	ADS Priority Selection †
•°5-013	Counter Up/Down Selection †
•°5-017	Maximum Copy Quantity (Copy Limit) †
•°5-019-xxx	Paper Size Set †
•°5-021-xxx	***Duplex Priority Selection (Energy Star) †***
•°5-022-xxx	***Energy Star Selection †***
•°5-101	Auto Reset Time Setting †
•°5-102	**Auto Energy Saver Time Setting †**
•°5-103	Auto Tray Shift †
°5-104	A3/DLT Double Count †
•°5-106	**Image Density Level Correction (ADS Correction) †**
•°5-107-xxx	**Image Shift Margin Adjustment †**
•°5-108	Edge Erase Margin Adjustment †
•°5-110	Center Erase Margin Adjustment †
°5-113	Coin Lock Installation †
5-115	Duplex Image Shift (Back Side Margin) †
°5-121	T/C (Total Counter) Count Up Timing †
•°5-122	**OHP Slip Sheet Mode Selection †**
5-127	APS Detection †
•°5-305-001	**Auto Shut Off Time Setting †**
°5-305-002	**Auto Shut Off Selection †**
°5-401	User Code Mode †
•°5-402	User Code Counter Check †
•°5-404-xxx	User Code Counter Clear †
•°5-405	User Code Number Setting †
•°5-407-xxx	User Code Number Clear †
°5-408	Number of Registered User Codes Display †
•°5-410	**User Code Reset Time Setting †**

Mode No.	Function
°5-501-001	PM Interval Setting †
°5-501-002	PM Interval Setting (PM Alarm Mode Setting) †
5-504	Used in Japan only. Do not change the factory setting.
5-505	Used in Japan only. Do not change the factory setting.
°5-507	Used in Japan only. Do not change the factory setting.
5-801	Memory All Clear †
5-802-xxx	Free Run Mode
5-803-xxx	Input Check Mode †
5-804-xxx	Output Check Mode
°5-810	SC Reset †
5-811	Used in Japan only. Do not change the factory setting.
°5-812	Not used
°5-816	Used in Japan only. Do not change the factory setting.
5-817	Used in Japan only. Do not change the factory setting.
°5-905	APS A4/LT Sideways Priority †
•°5-906	Manual Staple Reset Time Setting †
•°5-907	**Cover Mode Selection †**
•°5-908	Image Shift/Erase Selection †
•°5-909	10 key Zoom/Size Magnification †
•°5-910	Not used
Peripherals	
•°6-001	SADF Auto Reset Time Setting †
°6-003	Auto Sort Selection †
°6-005	Blank Copy for Last Odd Originals in Duplex †
6-006-xxx	DF Registration Adjustment †
6-009	DF Free Run with Paper
•°6-010	Auto APS Select (DF) †
•°6-011	Thick/Thin Original Mode Selection †
°6-101	**Sorter Installation †**
°6-102	**Sorter Stack Limit †**
°6-104	**Staple Sheet Limit †**
6-107	Sorter Free Run Mode
Counters	
°7-001	Total Operation Time Display †
°7-002	Total Original Counter Display †
°7-003	Copy Charge Counter for RDS/CSS Display † This is for use with features that are available only in Japan. However, it does show how many originals have been copied (total of DF mode + platen mode).

Mode No.	Function
°7-004	Initial Copy Counter Setting for RDS/CSS Display † This is for use with features that are available only in Japan. However, it does show the total number of copies that have been made.
°7-101-xxx	Total Copies by Paper Size †
°7-203	Drum Counter †
°7-204-xxx	Feed Unit Counter †
°7-205	DF Counter †
°7-206	Stapler Counter †
°7-301-xxx	Total Copies by Magnification †
°7-401	Total Service Call Counter †
°7-402	SC Counter by Service Call †
°7-501	Total Jam Counter (Copies + Originals) †
°7-502	Total Jams by Paper Size † (**Note:** This is actually the Total Copy Paper Jam Counter. The counter is not divided up by Paper Size.)
°7-503	Total Original Jam Counter
°7-504-xxx	Total Jams by Location †
°7-505-xxx	Total Original Jams by Location †
°7-801-xxx	Main ROM Version Display †
°7-803	PM Counter Check †
°7-804	PM Counter Clear
°7-807-001	SC Counter Clear †
°7-807-002	Copy Jam Counter Reset †
°7-807-003	Original Jam Counter Reset †
°7-808	Counter All Clear
°7-810	Copy Counter Clear
°7-811	DF Counter Clear
°7-816-xxx	Feed Unit Counter Clear †

12.1.2 SP Mode Table

<table>
<tr><th colspan="2">Mode No.</th><th>Function</th><th>Settings</th></tr>
<tr><td rowspan="2">1-001</td><td rowspan="2">Registration †</td><td>Adjusts leading edge registration.</td><td rowspan="2">0 ~ 32
Default = 16 ‡</td></tr>
<tr><td>*(0.5 mm per step [Range: –8.0 mm to +8.0 mm])*</td></tr>
<tr><td rowspan="2">**1-003-001
to
1-003-008**</td><td rowspan="2">**Paper Feed Timing †**</td><td>Adjusts the paper feed timing at registration for each paper feed station. Paper feed timing is in proportion to the amount of paper bending [mm] at registration.</td><td rowspan="2">0 ~ 32
Default = 16

SP1-003-008: Do not adjust this setting.</td></tr>
<tr><td>*(0.5 mm per step [Range: –8 mm to + 8 mm])*
<table>
<tr><th>SP Number</th><th>Without Duplex</th><th>With Duplex</th></tr>
<tr><td>SP1-003-001</td><td>1st tray</td><td>Duplex</td></tr>
<tr><td>SP1-003-002</td><td>2nd tray</td><td>1st tray</td></tr>
<tr><td>SP1-003-003</td><td>3rd tray</td><td>2nd tray</td></tr>
<tr><td>SP1-003-004</td><td>4th tray</td><td>3rd tray</td></tr>
<tr><td>SP1-003-005</td><td>5th tray</td><td>4th tray</td></tr>
<tr><td>SP1-003-006</td><td>By-pass</td><td>By-pass</td></tr>
<tr><td>SP1-003-007</td><td>LCT</td><td>LCT</td></tr>
<tr><td>SP1-003-008</td><td colspan="2">Japan only</td></tr>
</table>
</td></tr>
<tr><td>1-008</td><td>Misfeed Detection †</td><td>Switches misfeed detection on or off for test purposes (sensor signals are ignored). Only one copy can be made at a time, to prevent damage to the machine.</td><td>**0: OFF**
1: ON</td></tr>
<tr><td rowspan="2">**1-103**</td><td rowspan="2">**Fusing Idling †**</td><td>Selects the total time for the fusing idling during machine warm-up. For type 2, fusing idling starts when the detected temperature reaches the operating temperature –15°C. For type 1, fusing idling starts when the detected temperature reaches the operating temperature.</td><td rowspan="2">**0: OFF**
1: 60 s
2: 100 s
3: 180 s
4: 300 s</td></tr>
<tr><td>*The longer the selected fusing idling, the longer time the machine takes to reach the ready condition. After changing the setting, turn the main switch off and on.*</td></tr>
<tr><td rowspan="2">°1-104</td><td rowspan="2">Fusing Temperature Control †</td><td>Selects the fusing lamp temperature control mode.</td><td rowspan="2">**0: On/Off Control**
1: Phase Control</td></tr>
<tr><td>*After selecting the control mode, turn the main switch off and on.*</td></tr>
</table>

<table>
<tr><th colspan="2">Mode No.</th><th>Function</th><th>Settings</th></tr>
<tr><td>1-105-001</td><td>Fusing Temperature Adjustment (Main Fusing Lamp) †</td><td>Adjusts the temperature of the main fusing lamp, which heats the central area of the hot roller.
The selected temperature is displayed in the reduce/enlarge indicator.
<i>(1°C per step [Range: 170°C to 190°C])</i></td><td>170 ~ 190
Default = 175</td></tr>
<tr><td>1-105-002</td><td>Fusing Temperature Adjustment for Energy Saver Mode †</td><td>Adjusts the temperature of the fusing unit in energy saver mode.
(SP5-102 and SP5-305 are also related to Energy Saver Mode.)
<table><tr><th>SP Setting</th><th>Type 1</th><th>Type 2</th></tr><tr><td>0</td><td>185°C</td><td>175°C</td></tr><tr><td>1</td><td>170°C</td><td>145°C</td></tr></table>The lower the fusing temperature is, the greater the energy saving ratio is and the longer the waiting time until the copier returns to the ready condition.</td><td>Default = 1
(NA)
Default = 0
(Others)</td></tr>
<tr><td>1-105-003 (Type 2 only)</td><td>Fusing Temperature Adjustment (Secondary Fusing Lamp) †</td><td>Adjusts the temperature of the secondary fusing lamp, which heats both ends of the hot roller.
<i>(1°C per step [Range: 170°C to 190°C])</i></td><td>170 ~ 190
Default = 175</td></tr>
<tr><td>1-106-001</td><td>Fusing Temperature Display (Main Fusing Lamp) †</td><td>Displays the temperature (°C) at the surface of the central area of the hot roller, as measured by the thermistor.
<i>The temperature in energy saving mode cannot be displayed, as entering SP mode takes the machine out of this mode.</i></td><td></td></tr>
<tr><td><i>1-106-002</i></td><td><i>Fusing Temperature Display (Secondary Fusing Lamp) †</i></td><td>Displays the temperature (°C) at the surface of the ends of the hot roller, as measured by the thermistor.
<i>The temperature in energy saving mode cannot be displayed, as entering SP mode takes the machine out of this mode.</i></td><td></td></tr>
<tr><td>1-108</td><td>Forced Start †</td><td>Selects whether forced start is on or off.
<i>If forced start is switched on, the copier enters the ready condition even if the fusing temperature has not reached the required value yet. Use this for tests if the room temperature is low and you do not wish to wait for the lamps to warm up.</i></td><td>0: OFF
1: ON</td></tr>
<tr><td>1-801</td><td>Do not use</td><td>—</td><td></td></tr>
</table>

Mode No.		Function	Settings
1-902	Jogger Span Adjustment (Side Fence) †	Adjusts the stop position of the jogger side fence span of the duplex unit. *(0.5 mm per step [Range: –8.0 mm to +8.0 mm])* ***A214 copier only***	0 ~ 32 **Default = 16**
1-905	Jogger Span Adjustment (End Fence) †	Adjusts the stop position of the jogger end fence span of the duplex unit. *(0.5 mm per step [Range: –8.0 mm to +8.0 mm])* ***A214 copier only***	0 ~ 32 **Default = 16**
2-001	Drum Charge Voltage Adjustment (for copying) †	Adjusts the voltage applied to the drum charge roller during copying. *The adjustment factor set with this SP mode is added to the base voltage. (30 V per step [Range: Base voltage –480 V to Base voltage + 480 V])*	0 - 32 **Default = 16** **(0 V) ‡**
2-002-001 to 2-002-002	Drum Charge Voltage Display †	Displays the voltage applied to the drum charge roller. SP2-002-001: For copying SP2-002-002: For making VSP patterns *The first three digits are displayed in the reduce/enlarge indicator. The actual value is the displayed value x (–10) V. Just after the main switch is turned on, the initial setting voltage is displayed. After one or more copies, the actual applied voltage (including the process control corrections) is displayed.*	
2-003	Drum Charge Voltage Adjustment (for making VSP patterns) †	Adjusts the voltage applied to the drum charge roller when making VSP patterns. *The adjustment factor set with this SP mode is added to the base voltage. (10 V per step [Range: Base voltage –160 V to Base voltage + 160 V])*	0 - 32 **Default = 16** **(0 V) ‡**
2-101-001 to 2-101-002	Leading/Trailing Edge Erase Margin Adjustment †	Adjusts the leading and trailing edge erase margins. SP2-101-001: Leading edge erase margin SP2-101-002: Trailing edge erase margin *(0.5 mm per step [Range: 0.0 mm to +16.0 mm])*	0 - 32 Default = 16 ‡ (only 2-101-001 is on the data sheet)
2-201-001	Development Bias Adjustment (for copying) †	Adjusts the development bias for copying to make copies lighter or darker in general. *The adjustment factor set with this SP mode is applied to the base voltage. (20 V per step [Range: Base voltage –80 V to Base voltage +80 V])*	1 - 9 **Default = 5** **(0 V)** 1: Darkest 9: Lightest

Mode No.		Function	Settings
2-201-002	Lightest ID Level Development Bias Adjustment †	Adjusts the development bias for manual ID level 7.	**1: –40 V** 2: ±0 V 3: –80 V 4: –120 V
		The adjustment factor set with this SP mode is applied to the base voltage when ID level 7 is selected.	
2-203	**Development Bias Adjustment (for making VSP patterns) †**	Adjusts the development bias for making VSP patterns	1 - 10 **Default = 6 (0 V)**
		The adjustment factor set with this SP mode is added to the base voltage. *(20 V per step [Range: Base voltage –80 V to Base voltage + 100 V])*	
2-206-001 to 2-206-002	Development Bias Display †	Displays the development bias. SP2-206-001: Development bias used for copying. SP2-206-002: Development bias used for making VSP sensor patterns.	
		The first two digits are displayed in the reduce/enlarge indicator. The actual value is: displayed value x (–10) V. All process control corrections are included in the displayed value.	
2-207	Forced Toner Supply (shown as "Compulsory Toner Supply" on the display)	Forces the toner bottle to supply toner to the toner supply unit for 30 seconds.	
		This mode is started by pressing the ◇ key and stops automatically after about 30 seconds. Press the ◇/⊘ key to interrupt if necessary. This SP mode must be performed twice when installing the machine and when installing a new toner supply unit.	
2-208-001	Toner Supply Mode Selection †	Selects the toner supply mode. In many cases, the machine will change the toner supply mode automatically if either the TD or ID sensor become unreliable. However, sometimes it does not. If the TD sensor fails, you can select fixed supply mode as a temporary measure. If the ID sensor fails, you can select TD sensor supply mode. After repairing the machine, check whether the toner supply mode has gone back to the detect supply mode.	1: TD sensor supply mode 2: Fixed supply mode **3: Detect supply mode**

Mode No.		Function	Settings
2-208-002	Toner Supply Ratio (TD Sensor Supply Mode) †	Selects the toner supply ratio for TD sensor supply mode. For example, if the user normally makes copies of originals that are about 7% black, select the 7% setting for best results.	1: 7% **2: 15%** 3: 30% 4: 60%
2-208-003	**Toner Supply Ratio (Fixed Supply Mode) †**	Selects the toner supply ratio for Fixed Supply Mode. For example, if the user normally makes copies of originals that are about 6% black, select the 6% setting for best results.	1: 3% **2: 6%** 3: 10% 4: 15%
2-214	TD Sensor Initial Setting	Performs the TD sensor initial setting. This SP mode controls the voltage applied to the TD sensor to make the TD sensor output 2.5 ± 0.1 V. After using SP2-214, check SP2-220 to see if the sensor is working correctly. *This mode is started by pressing the ◇ key and stops automatically after about 2.5 minutes. Use this mode only after adding new developer.*	
2-215-001 to 2-215-002	TD Sensor Output Display †	Displays the TD sensor output voltage. SP2-215-001: V_T = Current TD sensor output SP2-215-002: V_{TREF} = Reference TD sensor output	
2-220	TD Sensor Initial Output Display †	Displays the TD sensor initial setting output (after doing SP2-214). *Normally, 2.5 ± 0.1 V is displayed.* *[Range: 0 V to 5.0 V]* *If it is not, the sensor may be defective.*	
2-222	Toner Supply Ratio (Detect Supply Mode) †	Selects the toner supply ratio for detect supply mode. For example, if the user normally makes copies of originals that are about 7% black, select the 7% setting for best results.	1: 7% **2: 15%** 3: 30% 4: 60%
2-301-001 to 2-301-002	**Transfer Current Adjustments † Factory Use Only: Do not change the settings.**		0 ~ 32 **12 (–20 µA)**
2-801	Developer Agitation	After the ◇ key is pressed, the developer is agitated. To stop, press the C/⊘ key. *Use this SP mode if the machine has not been used for a long time.*	
2-802	Drum Charge Roller Temperature †	Displays the drum charge roller temperature [0 ~ 60°C].	

Mode No.		Function	Settings
2-812	Drum Reverse Rotation Adjustment †	Adjusts the amount of the time for the drum reverse rotation after each copy job. *If paper dust remains on the drum, it may get into the recycled toner. If this is happening, increase the reverse rotation by increasing the value of the setting.*	0 ~ 32 **Default = 16 (about 3 mm)**
2-901	**Drum Charge Roller Cleaning Interval †**	Selects the drum charge roller cleaning interval. Turn the copier main switch off and on after changing the setting. *The drum charge roller is cleaned briefly at the end of each copy job. The drum charge roller is also cleaned for 5 seconds after the interval selected with this SP mode.*	0: Every 1,000 copies **1: Every 500 copies** 2: Every 200 copies 3: Every 100 copies
2-902	Do not use	—	
3-001	ID Sensor Initial Setting	Performs the ID sensor initial setting. ID sensor output for the bare area of the drum (V_{SG}) is adjusted to 4.0 ± 0.2 V. *To start this SP mode, press the ◇ key.*	
3-002	ID Sensor Initial Setting Display †	Displays the initial setting value of the ID sensor. *Normally 4.0 ± 0.2 V is displayed. If the ID sensor cannot be adjusted to 4.0 ± 0.2 V, the ID sensor or the OPC drum should be cleaned.*	
3-103-001 to 3-103-002	ID Sensor Output Display †	Displays the ID sensor outputs. SP3-103-001: V_{SP} SP3-103-002: V_{SG} *Normally, V_{SP} = 0.01 ~ 2.50 V, V_{SG} = 4.0 ± 0.2 V ($V_{SP}/V_{SG} \approx 0.1$)*	
3-105	Forced V_L Detection	After the ◇ key is pressed, the initial V_{LP}/V_{LG} (= V_{REF}) is determined. *For when to use this SP mode, see "Practical SP Mode Use Table".*	
3-106	Initial V_{LP}/V_{LG} Display †	Displays the initial V_{LP}/V_{LG} value determined by SP3-105.	
3-107	Current V_{LP}/V_{LG} Display †	Displays the current V_{LP}/V_{LG} value [%]. *This is the value currently being used for V_L correction.*	

<table>
<tr><th colspan="2">Mode No.</th><th>Function</th><th>Settings</th></tr>
<tr><td rowspan="2">3-111</td><td>Current VRP/VRG Display †</td><td>Displays the current VRP/VRG value [%]
<i>This is the value currently being used for VR correction.</i></td><td></td></tr>
<tr><td colspan="3">
<table>
<tr><th rowspan="2"></th><th colspan="3">ID Correction</th><th rowspan="2">Drum Charge Roller Correction Voltage</th><th rowspan="2">Development Bias Correction Voltage</th></tr>
<tr><th>±0 V</th><th>–40 V</th><th>–80 V</th></tr>
<tr><td rowspan="5">VRP/VRG x 100 (%)</td><td>74 ~ 100</td><td>68 ~ 100</td><td>62 ~ 100</td><td>±0 V</td><td>±0 V</td></tr>
<tr><td>53 ~ 73</td><td>50 ~ 67</td><td>43 ~ 61</td><td>–40 V</td><td>–40 V</td></tr>
<tr><td>41 ~ 52</td><td>37 ~ 49</td><td>26 ~ 42</td><td>–80 V</td><td>–80 V</td></tr>
<tr><td>31 ~ 40</td><td>26 ~ 36</td><td>19 ~ 25</td><td>–120 V</td><td>–120 V</td></tr>
<tr><td>0 ~ 30</td><td>0 ~ 25</td><td>0 ~ 18</td><td>–160 V</td><td>–160 V</td></tr>
</table>
</td></tr>
<tr><td>3-112</td><td>Forced VR Detection</td><td>After the ◇ key is pressed, forced VR detection is done.
<i>For when to use this SP mode, see "Practical SP Mode Use Table".</i></td><td></td></tr>
<tr><td>3-123</td><td>Drum Initialize</td><td>This resets the following data regarding the OPC drum:
1. VR correction level
2. VL correction level
3. OPC counter
4. T/H correction level
<i>This SP mode must be used only when a new drum is installed.</i> <i>Refer to "Practical SP Mode Use Table" for the exact timing for using this SP mode.</i></td><td></td></tr>
<tr><td>3-801</td><td>Auto Process Control Mode Selection †</td><td>Selects whether auto process control mode is off or performed at the interval shown.
If the auto process control mode is switched off, VR correction, VL correction, and the 1,000-copy process control cycle will not be performed.
<i>This SP mode can be used to help determine whether a copy quality problem is caused by process control or by the machine itself.</i></td><td>0: OFF
1: 1,000 copies
2: 500 copies
3: 200 copies</td></tr>
<tr><td>3-901</td><td>Free Run (Exposure Lamp Off)</td><td>Performs a free run with the exposure lamp off.
<i>Start the free run by pressing the ◇ key and stop it by pressing the C/⊘ key.</i> <i>Be sure to perform this mode without a development unit, or too much toner will be consumed from the developer, causing low image density.</i></td><td></td></tr>
</table>

Mode No.		Function	Settings
3-902	Forced Process Control	Performs the 1,000-copy process control cycles forcibly. V_{SG} initial adjustment → V_R detection → V_L detection → V_{ADS} (pattern) adjustment	
		This mode starts after the ◇ key is pressed.	
4-001	Exposure Lamp Voltage Adjustment †	Adjusts the exposure lamp voltage (0.5 V per step [Range: 50.0 V to 75.0 V])	50.0 ~ 75.0 V **Default = 63 V ‡**
		For 115 V machines, the actual applied voltage = displayed value x 1.1412. ***After doing this SP mode, ADS initial setting (SP4-201) and forced V_L detection (SP3-105) must also be done.*** *See "Replacement and Adjustment - Copy Quality Adjustments" for how to adjust.*	
°4-002	Exposure Lamp Voltage Display †	Displays the current exposure lamp voltage. (0.5 V per step [Range: 50.0 V to 85.0 V])	50.0 ~ 85.0 V
		For 115 V machines, the actual applied voltage = displayed value x 1.1412.	
4-008	Vertical Magnification Adjustment †	Adjusts the magnification in the paper travel direction. (0.1% per step [Range: –1.6% to +1.6%]) See "Replacement and Adjustment - Copy Quality Adjustments" for how to adjust.	0 ~ 32 V **Default = 16 ‡**

<table>
<tr><th colspan="2">Mode No.</th><th>Function</th><th>Settings</th></tr>
<tr><td rowspan="2">4-011-001
to
4-011-009</td><td rowspan="2">Lens Horizontal HP Adjustment †</td><td>Adjusts the lens horizontal home position for each paper feed station.
(0.2 mm per step [Range: –3.2 mm to +3.2 mm])
<table>
<tr><th>SP Number</th><th>Without Duplex</th><th>With Duplex</th></tr>
<tr><td>4-011-001</td><td>1st tray</td><td>Duplex</td></tr>
<tr><td>4-011-002</td><td>2nd tray</td><td>1st tray</td></tr>
<tr><td>4-011-003</td><td>3rd tray</td><td>2nd tray</td></tr>
<tr><td>4-011-004</td><td>4th tray</td><td>3rd tray</td></tr>
<tr><td>4-011-005</td><td>5th tray</td><td>4th tray</td></tr>
<tr><td>4-011-006</td><td>By-pass</td><td>By-pass</td></tr>
<tr><td>4-011-007</td><td>LCT</td><td>LCT</td></tr>
<tr><td>4-011-008</td><td colspan="2">Base Adjustment</td></tr>
<tr><td>4-011-009</td><td>ADF</td><td>ADF</td></tr>
</table>
</td><td rowspan="2">0 ~ 32 V
Default = 16 ‡
(only 4-011-008 is on the data sheet)</td></tr>
<tr><td><i>SP4-011-008 changes the home position for all paper feed stations at the same time. It is mainly used for making factory adjustments. If it is shifted by a certain amount, all other SP4-011 adjustments move by the same amount.
See "Replacement and Adjustment - Copy Quality Adjustments" , and "Side-to-side Registration" in the ARDF manual for details on how to adjust.</i></td></tr>
<tr><td rowspan="2">4-013</td><td rowspan="2">Scanner Free Run</td><td>Starts the scanner free run.</td><td rowspan="2"></td></tr>
<tr><td><i>Start the scanner free run by pressing the ◇ key, and stop it by pressing the C/⊚ key.</i></td></tr>
<tr><td>4-101</td><td>Horizontal Magnification Adjustment †</td><td>Adjusts the magnification perpendicular to the direction of paper travel.
(0.1% per step [Range: –1.6% to +1.6%])
See "Replacement and Adjustment - Copy Quality Adjustments" for how to adjust.</td><td>0 ~ 32
Default =16 ‡</td></tr>
<tr><td>4-102</td><td>Lens Error Correction †</td><td>Adjusts the lens position to correct for magnification in enlarge/reduce mode.
(0.1% per step [Range: –0.8% to +0.8%])</td><td>0 ~ 16
Default = 8
(0%) ‡</td></tr>
<tr><td>4-103</td><td>Focus Adjustment †</td><td>Adjusts the 3rd mirror position to correct the fine focus.
(0.05 mm per step [Range: left 3.75 mm to right 3.75 mm])
See "Replacement and Adjustment - Copy Quality Adjustments" for how to adjust.</td><td>30 ~ 150
Default = 75 ‡</td></tr>
</table>

<table>
<tr><th colspan="2">Mode No.</th><th>Function</th><th>Settings</th></tr>
<tr><td rowspan="2">4-201</td><td rowspan="2">Auto ADS Gain Adjustment</td><td>Adjusts the ADS gain automatically to make the sensor output 2.7 ± 0.1 V.</td><td rowspan="2"></td></tr>
<tr><td><i>Close the platen cover to prevent external light from reaching the ADS sensor. Then press the ◇ key to make the adjustment.</i></td></tr>
<tr><td>4-202</td><td>ADS Initial Gain Display †</td><td>Displays the ADS sensor output adjusted by SP4-201.</td><td></td></tr>
<tr><td>4-203</td><td>ADS Actual Gain Display †</td><td>Displays the current ADS sensor output.</td><td></td></tr>
<tr><td>4-301</td><td>APS Sensor Function Check †</td><td>Check the APS sensors.
If they are working correctly, the following value is displayed in the reduce/enlarge indicator.
<table>
<tr><th rowspan="2"></th><th colspan="2">LT Version</th><th rowspan="2">A4 Version</th></tr>
<tr><th>Without optional APS</th><th>With optional APS</th></tr>
<tr><td>ADF/Platen Open</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>ADF/Platen Closed</td><td>95</td><td>127</td><td>95</td></tr>
</table></td><td>LT version:
0 or 95 (without optional APS)
0 or 127 (with optional APS)
A4 version:
0 or 95</td></tr>
<tr><td rowspan="2">4-302</td><td rowspan="2">Optional APS Sensor †
(LT version only)</td><td>Set this to 1 when installing the optional APS sensor.</td><td rowspan="2">0: Not installed
1: Installed</td></tr>
<tr><td><i>This SP mode is effective only for the LT version. In the A4 version, even if "1" is selected, the setting is ignored.</i></td></tr>
<tr><td rowspan="2">4-303</td><td rowspan="2">APS A5/HLT Detection †</td><td>Selects whether A5/HLT forced detection is done or not.</td><td rowspan="2">0: NO
1: YES</td></tr>
<tr><td><i>If "YES" is selected, paper sizes that cannot be detected by the APS sensors are regarded as A5 lengthwise (for A4 models) or 5½" x 8½" (for LT models). If "NO" is selected, "Check Paper Size" will be displayed.</i></td></tr>
<tr><td>4-901</td><td>APS Size Priority
(for F4 size) †</td><td>Selects which copy paper size the machine selects when the APS sensors detect F4 lengthwise (8½" x 13").</td><td>0: 8½" x 13"
1: 8" x 13"
2: 8¼" x 13"</td></tr>
</table>

<table>
<tr><th colspan="2">Mode No.</th><th>Function</th><th>Settings</th></tr>
<tr><td rowspan="2">•°4-902</td><td rowspan="2">APS 8 k/16 k Detection †
(A4 versions only)</td><td>Selects whether the machine can select 8 k/16 k copy paper based on APS sensor readings.
If "YES" is selected, 8 k/16 k copy paper is selected under the following conditions:
<table>
<tr><th>Size detected by APS</th><th>Selected copy paper size</th></tr>
<tr><td>B4 lengthwise</td><td>8 k lengthwise
(267 mm x 390 mm)</td></tr>
<tr><td>A4 lengthwise</td><td>16 k lengthwise
(267 mm x 195 mm)</td></tr>
<tr><td>B5 sideways</td><td>16 k sideways
(115 mm x 267 mm)</td></tr>
</table></td><td rowspan="2">0: NO
1: YES</td></tr>
<tr><td><i>If "YES" is selected, the duplex end fence must be removed to allow the 8 k/16 k movement of the jogger fences.</i></td></tr>
<tr><td>•°5-001</td><td>All Indicators ON †</td><td>Turns on all indicators on the operation panel for 10 seconds. It can be manually turned off by pressing the ◇/◎ key.</td><td></td></tr>
<tr><td>•°5-002</td><td>Feed Station Priority Selection †</td><td>Selects the paper feed station priority.
<table>
<tr><th>Setting</th><th>Non duplex machines</th><th>Duplex machines</th></tr>
<tr><td>1</td><td>1st Tray</td><td>1st Tray</td></tr>
<tr><td>2</td><td>2nd Tray</td><td>2nd Tray</td></tr>
<tr><td>3</td><td>3rd Tray</td><td>3rd Tray</td></tr>
<tr><td>4</td><td>4th Tray</td><td>4th Tray</td></tr>
<tr><td>5</td><td>5th Tray</td><td>LCT</td></tr>
<tr><td>6</td><td>LCT</td><td>—</td></tr>
</table></td><td>1 ~ 6: Non duplex machines
1 ~ 5: Duplex machines
Default = 1 (without LCT)
Default = LCT (5 or 6) (with LCT)</td></tr>
<tr><td>•°5-003</td><td>APS Priority Selection †</td><td>Specifies whether the copier defaults to APS or manual mode when the main switch is turned on, auto reset, or mode cleared.</td><td>1: APS
2: Manual

Also see SP6-010.</td></tr>
<tr><td>•°5-004</td><td>ADS Priority Selection †</td><td>Specifies whether the copier defaults to ADS or manual ID mode when the main switch is turned on, auto reset, or mode cleared.</td><td>1: ADS
2: Manual</td></tr>
<tr><td>•°5-013</td><td>Counter Up/Down Selection †</td><td>Selects whether the counter counts up or down.</td><td>1: Up
2: Down</td></tr>
<tr><td>•°5-017</td><td>Maximum Copy Quantity (Copy Limit) †</td><td>Limits the maximum copy quantity that can be entered.</td><td>1 ~ 999
Default = 999</td></tr>
</table>

Mode No.		Function	Settings
•°5-019-001 to 5-019-008	Paper Size Set †	Sets the paper size for each paper tray and feed station.	For how to input the settings, see section 2.7.
•°5-021	***Duplex Priority Selection (Energy Star) †***	Specifies whether the copier defaults to duplex or single sided copies mode.	1: Duplex 2: Single side **Default = 1** (NA) **Default = 2** (Others)
°5-022	***Energy Star Selection †***	Specifies whether the copier performs the modes which are related to the Energy Star Standardization. The following SP modes are changed automatically when this setting is changed. • SP1-105-002 • SP5-021 • SP5-102 • SP5-305-001 • SP5-305-002	0: NO 1: YES **Default = 1** (NA) **Default = 0** (Others)
•°5-101	Auto Reset Time Setting †	Inputs the auto reset time after the copier enters standby, or disables auto reset. *(1 second per step [Range: 1 ~ 999])* *If "0" is selected, auto reset is disabled.*	0 ~ 999 **Default = 60**
•°5-102	**Auto Energy Saver Time Setting †**	Sets the time that the machine enters energy saver mode after entering the ready condition. *(1 minute per step)* *If "0" is selected, the energy saver mode is disabled (except for NA version).*	**NA version** 1 ~ 120 **Default = 15** **Other versions** 0 ~ 120 **Default = 1**
•°5-103	Auto Tray Shift †	Selects whether auto tray shift is on or off.	0: OFF **1: ON**
°5-104	A3/DLT Double Count †	Specifies whether the counter is doubled for A3/DLT paper. *If "ON" is selected, the total counter and the current user code counter counts up twice when A3/DLT copy paper is used.*	**0: OFF** 1: ON
•°5-106	**Image Density Level Correction (ADS Correction) †**	Selects the image density level correction. *The development bias voltage correction in ADS mode depends on this setting (see "ADS Correction" in the Process Control section for details).*	0: Darkest 1: Darker **2: Normal** 3: Lighter 4: Lightest

Mode No.		Function	Settings
•°5-107-001 to 5-107-004	**Image Shift Margin Adjustment †**	This controls the left and right margin width adjustment for both 1st and 2nd side copies. SP5-107-001: Left Margin (1st side) SP5-107-002: Right Margin (1st side) SP5-107-003: Left Margin (2nd side) SP5-107-004: Right Margin (2nd side) *SP5-908 must be at 2 for this to have any effect; this changes the function of the Erase key to a Margin Adjustment key.* *A4 version: 1 mm per step [Range: 0 mm to 15 mm]* *LT version: 0.01" per step [Range: 0" to 0.60"]*	**A4 version** 0 ~ 15 **Default = 5** **LT version** 0 ~ 0.60 **Default = 0.20**
•°5-108	Edge Erase Margin Adjustment †	Adjusts the edge erase margin width in erase edge mode. *SP5-908 must be at 1 for this to have any effect. A strip of the selected width will be erased around the edges of the copy image.*	**A4 version** 1: 5 mm **2: 10 mm** **LT version** 1: 0.20" **2: 0.40"**
•°5-110	Center Erase Margin Adjustment †	Adjusts the center erase margin width in erase center mode. *SP5-908 must be at 1 for this to have any effect.* *A4 version: 1 mm per step Range: 8 mm to 25 mm]* *LT version: 0.01" per step [Range: 0.32" ~ 1.00"]*	**A4 version** 8 ~ 25 **Default = 20** **LT version** 0.32 ~ 1.00 **Default = 0.80**
°5-113	Coin Lock Installation †	Specifies whether coin lock is installed or not (only for Japanese versions).	**0: Not installed** 1: Installed
5-115	Duplex Image Shift † (Back Side Margin)	Specifies whether duplex image shift (back side margin) is used or not. *If "YES" is selected, a 5 mm margin is made on the right of the reverse side of copies when making two-sided copies from one-sided originals.* *If the image shift mode has been selected with SP5-908 and if the user uses image shift mode, this SP mode has no effect.*	0: NO **1: YES**
°5-121	T/C (Total Counter) Count Up Timing †	Determines whether the total counter counts up at paper feed or at paper exit.	**0: Feed** 1: Exit
•°5-122	***OHP Slip Sheet Mode Selection †***	Selects whether to have a image on the OHP slip sheet or not.	0: Blank **1: Image**
5-127	***APS Detection †***	Selects whether APS detection is done or not.	0: NO **1: YES**

Mode No.		Function	Settings
•°***5-305-001***	***Auto Shut Off Time Setting †***	Selects the auto shut off time in one-minute steps. *The copier main switch is shut off automatically after the selected auto shut off time if SP5-305-002 is set to 0.*	**NA version** 1 ~ 120 **Default = 60** **Other versions** 1 ~ 999 **Default = 60**
•°***5-305-002***	***Auto Shut Off Selection †***	Selects the "Automatic Shut Off" mode. *The copier automatically shuts itself off at the auto shut off time selected (SP5-305-001).*	0: YES 1: NO **Default = 0** (NA) **Default = 1** (Others)
°5-401	**User Code Mode †**	After JP101 on the main board is cut, either key counter mode or user code mode can be selected with this SP mode.	**0: Key Counter** 1: User Code
•°5-402	User Code Counter Check †	Displays the user code counters. *The current user code is displayed in copy counter, and the copy count for that user code is displayed in the reduce/enlarge indicator. Hold down the "•" key to display the last three digits. Use the ⊞ and ⊟ keys to check each user code counter.*	
•°5-404-001 to 5-404-002	User Code Counter Clear †	Resets the user code counters. SP5-404-001: Resets the counter for the user code that is now displayed in the reduce/enlarge indicator. SP5-404-002: Resets all the UC counters. To reset the counter(s), press the R/# key. *SP5-404-001: The user code must be input at the numeric keys before it can be displayed and the counter reset, so you must know what user codes are in use. Take a look with SP5-405.*	
•°5-405	User Code Number Setting †	Use this mode to input the user code numbers (max. 3 digits). *Up to 50 user codes can be set. To input a code, enter it at the numeric keys then press the R/# key. Then you can input another. To check the user codes input so far, use the ⊞ and ⊟ keys. The user codes input will be displayed in reduce/enlarge counter.*	1 ~ 999 (max. 50 codes)

Mode No.		Function	Settings
•°5-407-001 to 5-407-002	User Code Number Clear †	Deletes user code numbers. SP5-404-001: Deletes individual user code numbers. Enter the required user code at the numeric keys, then press the R/# key. (To see which user codes are being used, use SP5-405.) SP5-404-002: Deletes all the user code numbers.	
°5-408	Number of Registered User Codes Display †	Displays the number of registered user codes in the reduce/enlarge indicator.	
•°5-410	***User Code Reset Time Setting †***	Selects the user code reset time in one-second steps. This is the time that the current user code remains active after the end of the copy job.	1 ~ 999 **Default = 60**
°5-501-001	PM Interval Setting †	Sets the PM interval. (1,000 copies per step [Range: 1 to 999])	1 ~ 999 **Default = 100**
°5-501-002	PM Interval Setting (PM Alarm Mode Setting) †	Specifies whether PM alarm mode is on or off. *If PM alarm mode is on, the manual ID level/ADS indicator and copy counter blink when the PM counter reaches the PM interval.*	**0: OFF** 1: ON
5-504	RDS/CSS Alarm Level for Paper Jam (Paper Jam Alarm Level Setting) † Used in Japan only. Do not change the factory setting.		
5-505	RDS/CSS Alarm Level for SC (Service Call Alarm Level Setting) † Used in Japan only. Do not change the factory setting.		
°5-507	RDS/CSS Alarm Level for Supplies (Supply Alarm Mode Setting) † Used in Japan only. Do not change the factory setting.		
5-801	Memory All Clear †	Resets all the correction data for process control and all software counters, and returns all modes and adjustments to the default settings. See Service Tables - section 2.2.4 for how to perform this SP mode. ***Normally, this SP mode should not be performed.*** *This SP mode is required only when replacing the RAM board, or when the copier malfunctions due to a damaged RAM board.*	

Mode No.		Function	Settings
5-802-001 to 5-802-002	Free Run Mode	Performs the free run SP5-802-001: Continuous free run SP5-802-002: One time free run *Before starting, close the platen or ARDF. Press the* ◇ *key to start the free run. Press the* C/⊛ *key to stop the free run.*	
5-803	Input Check Mode †	Displays the data received from sensors and switches.	For details, see Service Tables section 2-5.
5-804	Output Check Mode	Turns on the electrical components individually for test purposes.	For details, see Service Tables - section 2-6.
°5-810	SC Reset †	Resets any service call condition that was caused by a level A error (see the Troubleshooting section). After doing SP5-810, turn the copier main switch off and on.	
5-811	Machine Serial No. Input † For use with features that are available in Japan only		
°5-812	Do not use	—	
°5-816	RDS/CSS Function Setting † For use in Japan only. Do not change the factory setting.		
5-817	Repair Time Transmission † For use in Japan only. Do not change the factory setting.		
°5-905	APS A4/LT Sideways Priority †	Specifies whether the machine selects LT sideways paper if the original is A4. If "ON" is selected, LT sideways copy paper is selected automatically when the APS sensors detect an A4 sideways original. This feature does not work in reverse (A4 sideways paper is not selected for an LT sideways original).	**0: OFF** 1: ON
•°5-906	Manual Staple Reset Time Setting †	Sets the manual staple reset time. (1 second per step [Range: 1 to 999]) *After the end of a copy job in sort mode, manual staple mode is reset automatically when the manual staple reset time has passed.*	1 ~ 999 **Default = 20 s**
•°5-907	**Cover Mode Selection †**	Used to select whether to have front cover, front and back covers, or front cover with image and back cover blank image added to copies in cover mode. Copy paper for the cover pages should be placed on the by-pass feed table.	1: Front/Back **2: Front** 3: Front with Image/Back is blank
•°5-908	Image Shift/Erase Selection †	Selects whether to have an image shift mode or an image erase mode.	**1: Erase mode** 2: Shift mode

Mode No.		Function	Settings
•°5-909	10 key Zoom/Size Magnification †	Selects whether to have a 10 key zoom function or a size magnification function.	**1: Size magnification** 2: 10 key zoom function
•°5-910	Do not use	—	
•°6-001	SADF Auto Reset Time Setting †	Sets the auto reset time for SADF mode. (1 second per step [Range: 1 to 99 seconds])	1 ~ 99 **Default = 5**
°6-003	Auto Sort Selection †	Specifies whether auto sort mode is on or off. In auto sort mode, when two or more originals are placed on the ADF, sort mode is selected if the copy quantity is between 2 and 20.	**0: OFF** 1: ON
°6-005	Blank Copy for Last Odd Originals in Duplex †	Specifies whether a blank copy is added after the last page for an odd number of originals in duplex mode. *In SADF or platen mode, the last page always stays in the duplex unit, regardless of this setting.*	0: Not added (the last page stays in the duplex unit) **1: Added**
6-006-001 to 6-006-002	DF Registration Adjustment †	Adjusts the registration of the document feeder. SP6-006-001: One-sided original SP6-006-002: Two-sided original *(0.3 mm per step [Range: –4.8 mm to +4.8 mm])* *See "Vertical Registration" in the ARDF manual for details on how to use these adjustments.*	0 ~ 32 **Default = 16**
6-009	DF Free Run with Paper	To start the DF free run, put some sheets of paper on the ARDF then press the ◇ key. Stop the free run by pressing C/⊘ key. *This is a general free run controlled from the copier. For more detailed free run modes, see the manual for the DF.*	
•°6-010	Auto APS Select (DF) †	Selects whether auto APS mode is used with the DF or not. *If "ON" is selected, APS mode is selected automatically when an original is placed on the DF. This SP mode is in effect only when the APS priority (SP5-003) is set to Manual.*	0: OFF **1: ON**
•°6-011	Thick/Thin Original Mode Selection †	Selects the original feed type for the DF. In thin mode, originals will not be pushed back against the left scale.	**0: Thick mode** 1: Thin mode

Mode No.		Function	Settings
°6-101	**Sorter Installation †**	Use this to specify which sorter is installed.	**0: No sorter** 1: A557 sorter 2: A556 sorter 3: Not used 4: A568 sorter adapter only
		After setting this SP mode, the copier main switch must be turned off and on. For the A555 and A658 sorter stapler, the setting does not have to be changed (keep it at 0).	
°6-102	**Sorter Stack Limit †**	Select which sorter stack limit to use.	0: OFF **1: ON**
		OFF: Sorting and stacking can be done until the sorter tray cannot take any more paper. Then copying stops and the R indicator lights. *ON: Sorting and stacking can be done until the following limit is reached. Then copying stops and the R indicator lights.* **A658 Sorter/Stapler** Sort Mode: 30 (A4/LT), 25 (B4/LG, A3/DLT) Stack Mode: 25 (A4/LT, 20 (B4/LG, A3/DLT) **A555 Sorter/Stapler** Sort Mode: 30 (A4/LT), 25 (B4/LG, A3/DLT) Stack Mode: 25 (A4/LT), 20 (B4/LG, A3/DLT) **A556 Sorter** Sort Mode: 30 (A4/LT), 15 (B4/LG), 10 (A3/DLT) Stack Mode: 30 (A4/LT), 10 (B4/LG, A3/DLT) **A557 Sorter** Sort or Stack Mode: 20 (A4/LT), 15 (B4/LG), 10 (A3/DLT)	
°6-104	**Staple Sheet Limit †**	Select whether there is a stapling limit for the sorter stapler.	0: OFF **1: ON**
		OFF: Copies of up to 25 pages can be stapled for all paper sizes. *ON: The staple indicator will go out after the following limit number of pages has been stacked and stapling will not be done even if the user selects stapling mode.* **A658 Sorter/Stapler:** 20 (A4 - B5/LT, A3 - B4 / DLT - LG) **A555 Sorter/Stapler:** 20 (A4 - B5/LT, A3 - B4 / DLT - LG)	
6-107	Sorter Free Run Mode	Start the sorter free run by pressing the ◇ key. Stop it by pressing the C/⊘ key.	
		This is a general free run controlled from the copier. For more detailed free run modes, see the sorter manuals.	
°7-001	Total Operation Time Display †	Displays the total operation time (hours).	
		The first three digits are displayed in the reduce/enlarge indicator. Hold down the "•" key to display the last three digits.	

<table>
<tr><th colspan="2">Mode No.</th><th>Function</th><th>Settings</th></tr>
<tr><td rowspan="2">°7-002</td><td rowspan="2">Total Original Counter Display †</td><td>Displays the total number of scanned originals (DF + platen).</td><td rowspan="2"></td></tr>
<tr><td><i>The first three digits are displayed in the reduce/enlarge indicator. Hold down the "•" key to display the last three digits.</i></td></tr>
<tr><td>°7-003</td><td colspan="3">Copy Charge Counter for RDS/CSS Display †
This is for use with features that are available only in Japan. However, it does show how many originals have been copied (total of DF mode + platen mode).
The 4th ~ 6th digits are displayed in the reduce/enlarge indicator. Hold down the "0" key to display the 7th digit, and hold down the "•" key to display the 3rd ~ 1st digits.</td></tr>
<tr><td>°7-004</td><td colspan="3">Initial Copy Counter Setting for RDS/CSS Display †
This is for use with features that are available only in Japan. However, it does show the total number of copies that have been made.
The 4th ~ 6th digits are displayed in the reduce/enlarge indicator. Hold down the "0" key to display the 7th digit, and hold down the "•" key to display the 3rd ~ 1st digits.</td></tr>
<tr><td rowspan="2">°7-101-001
to
7-101-005</td><td rowspan="2">Total Copies by Paper Size †</td><td>Displays the total number of copies by paper size.
<table>
<tr><th>SP Number</th><th>A4 Version</th><th>LT Version</th></tr>
<tr><td>SP7-101-001</td><td>A3</td><td>DLT</td></tr>
<tr><td>SP7-101-002</td><td>B4</td><td>LG</td></tr>
<tr><td>SP7-101-003</td><td>A4</td><td>LT</td></tr>
<tr><td>SP7-101-004</td><td>B5</td><td>HLT</td></tr>
<tr><td>SP7-101-005</td><td>Others</td><td>Others</td></tr>
</table>
</td><td rowspan="2"></td></tr>
<tr><td><i>The first three digits are displayed in the reduce/enlarge indicator. Hold down the "•" key to display the last three digits.</i></td></tr>
<tr><td rowspan="2">°7-203</td><td rowspan="2">Drum Counter †</td><td>Displays the drum rotation time (hours).</td><td rowspan="2"></td></tr>
<tr><td><i>The first three digits are displayed in the reduce/enlarge indicator. Hold down the "•" key to display the last three digits.</i></td></tr>
</table>

<table>
<tr><th colspan="2">Mode No.</th><th>Function</th><th>Settings</th></tr>
<tr><td rowspan="2">°7-204-001
to
7-204-008</td><td rowspan="2">Feed Unit Counter †</td><td>Displays the total number of copies fed from each feed unit.
<table>
<tr><th>SP Number</th><th>Without Duplex</th><th>With Duplex</th></tr>
<tr><td>SP7-204-001</td><td>1st tray</td><td>—</td></tr>
<tr><td>SP7-204-002</td><td>2nd tray</td><td>1st tray</td></tr>
<tr><td>SP7-204-003</td><td>3rd tray</td><td>2nd tray</td></tr>
<tr><td>SP7-204-004</td><td>4th tray</td><td>3rd tray</td></tr>
<tr><td>SP7-204-005</td><td>5th tray</td><td>4th tray</td></tr>
<tr><td>SP7-204-006</td><td>LCT</td><td>LCT</td></tr>
<tr><td>SP7-204-007</td><td>By-pass</td><td>By-pass</td></tr>
<tr><td>SP7-204-008</td><td>—</td><td>Duplex</td></tr>
</table></td><td rowspan="2"></td></tr>
<tr><td><i>The first three digits are displayed in the reduce/enlarge indicator. Hold down the "•" key to display the last three digits.</i></td></tr>
<tr><td rowspan="2">°7-205</td><td rowspan="2">DF Counter †</td><td>Displays the total number of originals fed by the DF.</td><td rowspan="2"></td></tr>
<tr><td><i>The first three digits are displayed in the reduce/enlarge indicator. Hold down the "•" key to display the last three digits.</i></td></tr>
<tr><td rowspan="2">°7-206</td><td rowspan="2">Stapler Counter †</td><td>Displays the total number of stapling runs.</td><td rowspan="2"></td></tr>
<tr><td><i>The first three digits are displayed in the reduce/enlarge indicator. Hold down the "•" key to display the last three digits.</i></td></tr>
<tr><td rowspan="2">°7-301-001
to
7-301-003</td><td rowspan="2">Total Copies by Magnification †</td><td>Displays the following counters:
7-301-001: Copies made in full size mode
7-301-002: Copies made with reduction
7-301-003: Copies made with enlargement</td><td rowspan="2"></td></tr>
<tr><td><i>The first three digits are displayed in the reduce/enlarge indicator. Hold down the "•" key to display the last three digits.</i></td></tr>
<tr><td>°7-401</td><td>Total Service Call Counter †</td><td>Displays the total number of service calls that have occurred.</td><td></td></tr>
<tr><td rowspan="2">°7-402</td><td rowspan="2">SC Counter by Service Call †</td><td>Displays the service call counters for each service call code.</td><td rowspan="2"></td></tr>
<tr><td>The service call code is displayed in the copy counter indicator, and the number of times this SC code has occurred is displayed in reduce/enlarge indicator.
By pressing the ⊞ and ⊟ keys, another service call number and its counter can be displayed.</td></tr>
</table>

<table>
<tr><th colspan="2">Mode No.</th><th>Function</th><th>Settings</th></tr>
<tr><td rowspan="2">°7-501</td><td rowspan="2">Total Jam Counter †
(Copies + Originals)</td><td>Displays the total number of copy jams plus original jams (max. 4 digits).</td><td rowspan="2"></td></tr>
<tr><td><i>The first digit is displayed in the reduce/enlarge indicator. Hold down the "•" key to display the last three digits.</i></td></tr>
<tr><td rowspan="2">°7-502</td><td rowspan="2">Total Jams by Paper Size †
(Note: This is actually the Total Copy Paper Jam Counter. The counter is not divided up by Paper Size)</td><td>Displays the total copy paper jam counter (max. 4 digits).</td><td rowspan="2"></td></tr>
<tr><td><i>The first digit is displayed in the reduce/enlarge indicator. Hold down the "•" key to display the last three digits.</i></td></tr>
<tr><td rowspan="2">°7-503</td><td rowspan="2">Total Original Jam Counter</td><td>Displays the total original jam counter (max. 4 digits).</td><td rowspan="2"></td></tr>
<tr><td><i>The first digit is displayed in the reduce/enlarge indicator. Hold down the "•" key to display the last three digits.</i></td></tr>
<tr><td rowspan="2">°7-504-001
to
7-504-006</td><td rowspan="2">Total Jams by Location †</td><td>Displays the total copy paper jam counts by location (max. 4 digits).
<table>
<tr><th>SP Number</th><th>Paper Jam Location Symbol</th></tr>
<tr><td>SP7-504-001</td><td>Y</td></tr>
<tr><td>SP7-504-002</td><td>A</td></tr>
<tr><td>SP7-504-003</td><td>B</td></tr>
<tr><td>SP7-504-004</td><td>C</td></tr>
<tr><td>SP7-504-005</td><td>Z</td></tr>
<tr><td>SP7-504-006</td><td>R</td></tr>
</table></td><td rowspan="2"></td></tr>
<tr><td><i>The first one digit is displayed in the reduce/enlarge indicator. Hold down the "•" key to display the last three digits.</i></td></tr>
<tr><td rowspan="2">°7-505-001
to
7-505-002</td><td rowspan="2">Total Original Jams by Location †</td><td>Displays the total original jams in the DF by location (max. 4 digits).
SP7-505-001: Feed-in section
SP7-505-002: Feed-out section</td><td rowspan="2"></td></tr>
<tr><td><i>The first digit is displayed in the reduce/enlarge indicator. Hold down the "•" key to display the last three digits.</i></td></tr>
</table>

<table>
<tr><th colspan="2">Mode No.</th><th>Function</th><th>Settings</th></tr>
<tr><td rowspan="2">°7-801-001
to
7-801-004</td><td rowspan="2">Main ROM Version Display †</td><td>Displays the main ROM version.
SP7-801-001: Copier main ROM version
SP7-801-002: Paper tray unit main ROM version
SP7-801-003: DF main ROM version
SP7-801-004: Sorter stapler main ROM version</td><td rowspan="2"></td></tr>
<tr><td>*The ROM version is displayed by a six-digit number. The first three digits are displayed in the reduce/enlarge indicator. Hold down the "•" key to display the last three digits. The six-digit number shows the ROM version as follows.*
Last four digits of ROM P/No. Suffix of ROM P/No.
<table>
<tr><th>Last two digits</th><th>Suffix</th><th>Last two digits</th><th>Suffix</th></tr>
<tr><td>00</td><td>No suffix</td><td>13</td><td>M</td></tr>
<tr><td>01</td><td>A</td><td>14</td><td>N</td></tr>
<tr><td>02</td><td>B</td><td>16</td><td>P</td></tr>
<tr><td>03</td><td>C</td><td>17</td><td>Q</td></tr>
<tr><td>04</td><td>D</td><td>18</td><td>R</td></tr>
<tr><td>05</td><td>E</td><td>19</td><td>S</td></tr>
<tr><td>06</td><td>F</td><td>20</td><td>T</td></tr>
<tr><td>07</td><td>G</td><td>22</td><td>V</td></tr>
<tr><td>08</td><td>H</td><td>23</td><td>W</td></tr>
<tr><td>10</td><td>J</td><td>24</td><td>X</td></tr>
<tr><td>11</td><td>K</td><td>25</td><td>Y</td></tr>
<tr><td>12</td><td>L</td><td>26</td><td>Z</td></tr>
</table>
Note: *09, 15, 21 do not exist because suffixes I, O, and U are not used.*</td></tr>
<tr><td rowspan="2">°7-803</td><td rowspan="2">PM Counter Check †</td><td>Displays the PM counter after the last PM (max. 6 digits).</td><td rowspan="2"></td></tr>
<tr><td>*The first three digits are displayed in the reduce/enlarge indicator; hold down the "•" key to display the last three digits.*</td></tr>
<tr><td rowspan="2">°7-804</td><td rowspan="2">PM Counter Clear</td><td>Resets the PM counter.</td><td rowspan="2"></td></tr>
<tr><td>*The counter will be reset when you press the final R/# key when entering this SP mode.*</td></tr>
<tr><td rowspan="2">°7-807-001</td><td rowspan="2">SC Counter Clear †</td><td>Resets the total SC counter (SP7-401) and the individual counters for each type of Service Call (SP7-402).</td><td rowspan="2"></td></tr>
<tr><td>*To reset the counters, press the R/# key.*</td></tr>
</table>

<table>
<tr><th colspan="2">Mode No.</th><th>Function</th><th>Settings</th></tr>
<tr><td>°7-807-002</td><td>Copy Jam Counter Reset †
(displayed as "SC Counter Clear")</td><td>Resets the total copy jam counter (SP7-502) and the copy jam counters for individual locations (SP7-504).
<i>To reset the counters, press the R/# key.</i></td><td></td></tr>
<tr><td>°7-807-003</td><td>Original Jam Counter Reset †
(displayed as "SC Counter Clear")</td><td>Resets the total original jam counter (SP7-503) and the original jam counters for individual locations (SP7-505).
<i>To reset the counters, press the R/# key.</i></td><td></td></tr>
<tr><td>°7-808</td><td>Counter All Clear</td><td>Resets the following counters.
<table>
<tr><th>Counters that are reset</th><th>Counter check</th></tr>
<tr><td>Operation Time</td><td>SP7-001</td></tr>
<tr><td>Scanning Counter</td><td>SP7-002</td></tr>
<tr><td>Copy Counter</td><td>SP7-101</td></tr>
<tr><td>Total Sheets of Paper Fed from the Paper Tray</td><td>SP7-204</td></tr>
<tr><td>DF Originals Counter</td><td>SP7-205</td></tr>
<tr><td>Stapler Counter</td><td>SP7-206</td></tr>
<tr><td>Reduction/Enlargement Counter</td><td>SP7-301</td></tr>
<tr><td>Total Service Call Counter</td><td>SP7-401</td></tr>
<tr><td>Each Service Call Counter</td><td>SP7-402</td></tr>
<tr><td>Jam Total Counter</td><td>SP7-501</td></tr>
<tr><td>Copy Paper Jam Total Counter</td><td>SP7-502</td></tr>
<tr><td>Original Jam Total Counter</td><td>SP7-503</td></tr>
<tr><td>Total Counter of Copy Paper Jams for Each location</td><td>SP7-504</td></tr>
<tr><td>Total Counter of Original Paper Jams for Each location</td><td>SP7-505</td></tr>
<tr><td>PM Counter</td><td>SP7-803</td></tr>
</table>
<i>After pressing the final R/# key when entering this SP mode, the counters will be reset.</i></td><td></td></tr>
<tr><td>°7-810</td><td>Copy Counter Clear</td><td>Resets the following counters.
• Total Original Counter (SP7-002)
• Total Copies by Paper Size (SP7-101)
• Total Copies by Magnification (SP7-301)
<i>After pressing the final R/# key when entering this SP mode, the counters will be reset.</i></td><td></td></tr>
<tr><td>°7-811</td><td>DF Counter Clear</td><td>Resets the DF counter (SP7-205).
<i>After pressing the final R/# key when entering this SP mode, the counter will be reset.</i></td><td></td></tr>
</table>

<table>
<tr><th colspan="2">Mode No.</th><th>Function</th><th>Settings</th></tr>
<tr><td>°7-816-001
to
7-816-008</td><td>Feed Unit Counter Clear †</td><td>Reset one of the following counters by pressing the R/# key.
<table>
<tr><th>SP Number</th><th>Without Duplex</th><th>With Duplex</th></tr>
<tr><td>SP7-816-001</td><td>1st tray</td><td>—</td></tr>
<tr><td>SP7-816-002</td><td>2nd tray</td><td>1st tray</td></tr>
<tr><td>SP7-816-003</td><td>3rd tray</td><td>2nd tray</td></tr>
<tr><td>SP7-816-004</td><td>4th tray</td><td>3rd tray</td></tr>
<tr><td>SP7-816-005</td><td>5th tray</td><td>4th tray</td></tr>
<tr><td>SP7-816-006</td><td>LCT</td><td>LCT</td></tr>
<tr><td>SP7-816-007</td><td>By-pass</td><td>By-pass</td></tr>
<tr><td>SP7-816-008</td><td>—</td><td>Duplex</td></tr>
</table></td><td></td></tr>
</table>

12.2 UP MODE AND SP MODE CROSS REFERENCE TABLE

UP Mode	SP Mode	Function
1	5-019	Paper Size Set
2	5-002	Feed Station Priority Selection
3	5-003	APS Priority Selection
4	6-010	Auto APS Select (DF)
5	5-103	Auto Tray Shift
6	5-013	Counter Up/Down Selection
7	5-017	Maximum Copy Quantity
8	5-101	Auto Reset Time Setting
9	5-102	Auto Energy Saver Time Setting
10	5-305-001	Auto Off Time Setting
11	5-004	ADS Priority Selection
12	5-106	Image Density Level Correction
13	5-907	Cover Mode Selection
14	5-908	Image Shift/Erase Selection
15	5-909	10 Key Zoom/Size Magnification
16	5-107	Image Shift Margin Adjustment
17	5-108	Edge Erase Margin Adjustment
18	5-110	Center Erase Margin Adjustment
19	5-906	Manual Staple Reset Time Setting
20	6-001	SADF Auto Reset Time Setting
21	6-002	Not used
22	6-011	Thick/Thin Original Mode Selection
23	5-402	User Code Counter Check
24	5-404	User Code Counter Clear
25	5-405	User Code Number Setting
26	5-407	User Code Number Clear
27	5-001	All Indicators On
28	4-902	Not used
29	5-122	OHP Slip Sheet Mode Selection
30	5-910	Guidance Language Set
31	5-410	User Code Reset Time Setting
32	5-021	Duplex Priority Selection (Energy Star)

13. PREVENTIVE MAINTENANCE SCHEDULE

13.1 PM TABLE

NOTE: The amounts mentioned as the PM interval indicate the number of copies.

Symbol key: C: Clean R: Replace L: Lubricate I: Inspect

	EM	120 k	240 k	360 k	NOTE
OPTICS					
Mirrors, Lens, Reflector		C	C	C	Cotton pad with water, or blower brush
Exposure Glass	C	C	C	C	Alcohol or glass cleaner
Exposure Lamp	I	I	I	I	Replace if necessary
Green Filter		C	C	C	Dry cloth
Scanner Guide Rails		C	C	C	Dry cloth
ADS, APS sensors		C	C	C	Blower brush. Do SP4-201 after cleaning the ADS sensor.
Lens Block Guide Rail	C	C	C	C	Dry cloth
Dust Filter		C	C	C	Replace if necessary
NOTE: After cleaning the exposure lamp and/or optics, do SP4-001, then 4-201, then 3-105. The toner shield glass has been eliminated. ✻					
AROUND THE DRUM					
Drum Charge Roller		R	R	R	Clean with the special cloth if necessary (the cloth must be dry)
Drum Charge Roller Cleaner		R	R	R	Replace with the drum charge roller as a set.
Drum Charge Roller Terminal		R	R	R	Replace with the drum charge roller as a set.
ID Sensor		C	C	C	Blower brush. After cleaning, do SP3-001 then SP3-112.
Erase Lamp		C	C	C	Dry cloth
Quenching Lamp		C	C	C	Dry cloth
Pick-off Pawls		C	R	C	Dry cloth
Pre-Transfer Lamp		C	C	C	Dry cloth and blower brush
DEVELOPMENT UNIT					
Developer		R	R	R	Do SP2-214 after replacement.
Side Seal		I	I	I	
Development Filter		R	R	R	
Entrance Seal	C	C	C	C	Replace if necessary
Toner Supply Unit	C	C	C	C	Blower brush

	EM	120 k	240 k	360 k	NOTE
PAPER FEED (for each paper feed station)					
Feed Rollers (Paper tray) ✻	C	R	R	R	Water
Pick-up, Feed, Separation Rollers (LCT, By-pass feed)	C	C	R	C	Clean with water. Replace these rollers and the torque limiter as a set.
Separation Torque Limiter (By-pass feed) (A212 only)			R		Clean with water. Replace these rollers and the torque limiter as a set.
Paper Feed Guide Plate		C	C	C	Alcohol or water
Relay rollers		C	C	C	Alcohol or water
Registration roller		C	C	C	Alcohol or water
Bottom Plate Pad (Paper tray, By-pass feed, LCT)	C	R	R	R	Water
CLEANING UNIT					
Drum Cleaning Blade		R	R	R	Spread setting powder. See "Drum Cleaning Blade Replacement".
Side Seal		C	C	C	Replace if necessary
Cleaning Entrance Seal		C	C	C	Replace if necessary
TRANSFER BELT UNIT					
Transfer Belt	C	C	R	C	Spread setting powder. "See Transfer Belt Cleaning Blade Replacement" Wipe with a dry cloth.
Transfer Belt Cleaning Blade	C	R	R	R	
Used Toner Tank		C	C	C	Blower brush or vacuum cleaner
FUSING UNIT					
Fusing Entrance and Exit Guide Plates		C	C	C	Suitable solvent
Fusing Lamps		I	I	I	Replace if necessary
Hot Roller		R	R	R	
Pressure Roller		C	R	C	Suitable solvent
Fusing Thermistors	C	I	I	I	Suitable solvent
Hot and Pressure Roller Bearings		I	I	I	Replace if necessary
Fusing Antistatic Brush		I	I	I	Replace if necessary
Cleaning Roller		R	R	R	Suitable solvent
Cleaning Roller Bushings		I	I	I	Replace if necessary
Fusing Exit Rollers			C		
Turn Guide Transport Rollers			C		

	EM	120 k	240 k	360 k	NOTE
Hot Roller Strippers	C	R	R	R	
DUPLEX TRAY					
Clutch Spring		L	L	L	Mobil Temp 78. See Note 1.
Feed Roller		R	R	R	
Bottom Plate Pad		R	R	R	
Mylars		I	I	I	Replace if necessary
OTHERS					
Drive Belts		I	I	I	Replace if necessary

	EM	120 k	240 k	360 k	NOTE
SORTER ADAPTER (A568)					
Exit Drive Roller			C		Alcohol or Water
Upper Roller			C		Alcohol or Water

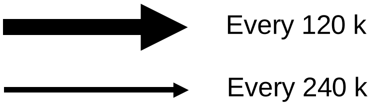
	EM	120 k	240 k	360 k	NOTE
PAPER TRAY UNIT (A549/A550)					
Pick-up, Feed, Separation Rollers	C	C	R	C	Water, Replace these rollers as a set.
Relay rollers		C	C	C	Alcohol or water
Bottom Plate Pad	C	R	R	R	Water
Relay Clutch		I	I	I	Replace every 1,500 k copies.
Feed Clutch		I	I	I	Replace if necessary
Drive Belts		I	I	I	Replace if necessary

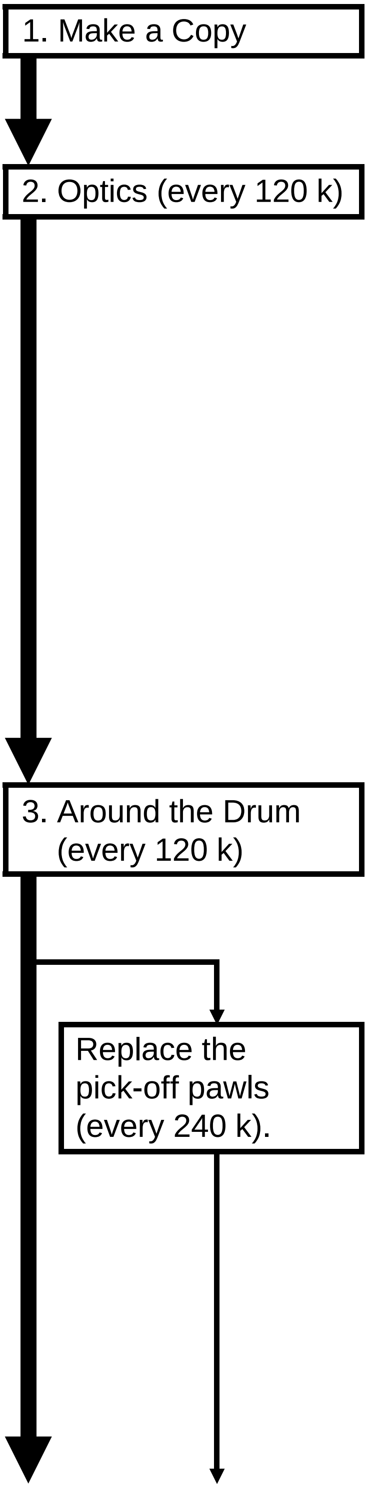
	EM	80 k	160 k	240 k	NOTE
AUTO DOCUMENT FEEDER (A663) (for originals)					
Transport Belt	C	R	R	R	Belt cleaner
Friction Belt	C	R	R	R	Water
Separation Roller	C	R	R	R	Water

	EM	PM	NOTE
20-BIN SORTER STAPLER (A658)			
Transport and Exit Rollers	C	C	Alcohol or water
Bins	C	C	Alcohol or water
Bin and Paper Sensors	C	C	Blower brush

	EM	PM	NOTE
Bushings	L	L	Launa oil; if bushings generate noise.
Helicam Wheels	L	L	Grease G501; if worm gears generate noise.
Bin Cam Tracks	L	L	Grease G501; if bin cam tracks generate noise.
10-BIN SORTER STAPLER (A555)			
Transport Roller	C	C	Alcohol or water
Bins	C	C	Alcohol or water
Bin and Paper Sensors	C	C	Blower brush
Bushings	L	L	Launa oil; if bushings generate noise.
Helicam Wheels	L	L	Grease G501; if helicam wheels generate noise.
SORTER (A556/A557)			
Bin Guide/Wheel	L	L	Grease G501; if those generate noise.
Bushings	L	L	Grease G501; if bushings generate noise.
Exit Roller	C	C	Alcohol or water

13.2 REGULAR PM PROCEDURE


Every 120 k
Every 240 k


1. Make a Copy
2. Optics (every 120 k)
3. Around the Drum (every 120 k)
Replace the pick-off pawls (every 240 k).

Make a copy of an OS-A3 test chart at manual image density level 4.

1. Clean the mirrors, lens, and reflectors with a soft cloth, cotton pad with water, or a blower brush.
2. Clean the exposure glass with alcohol or glass cleaner.
3. Clean the scanner guide rail with a dry cloth.
4. Clean the lens block guide rail with a dry cloth.
5. Clean the ADS sensor and the original width and length sensors
6. Inspect the exposure lamp.
7. Clean the dust filter.

1. Remove the drum and clean the ID sensor with a blower brush.
2. Clean the pick-off pawls.
3. Clean the quenching, erase, and pre-transfer lamps with a dry cloth. Discharge any static electricity before putting them back.
4. Put back the drum.
5. Replace the drum charge roller, drum charge roller cleaner, and drum charge roller terminal and roller terminal.

4. Cleaning Unit (every 120 k)

1. Clean the inside of the cleaning unit and the seals.
2. Replace the cleaning blade.

5. Development Unit (every 240 k)

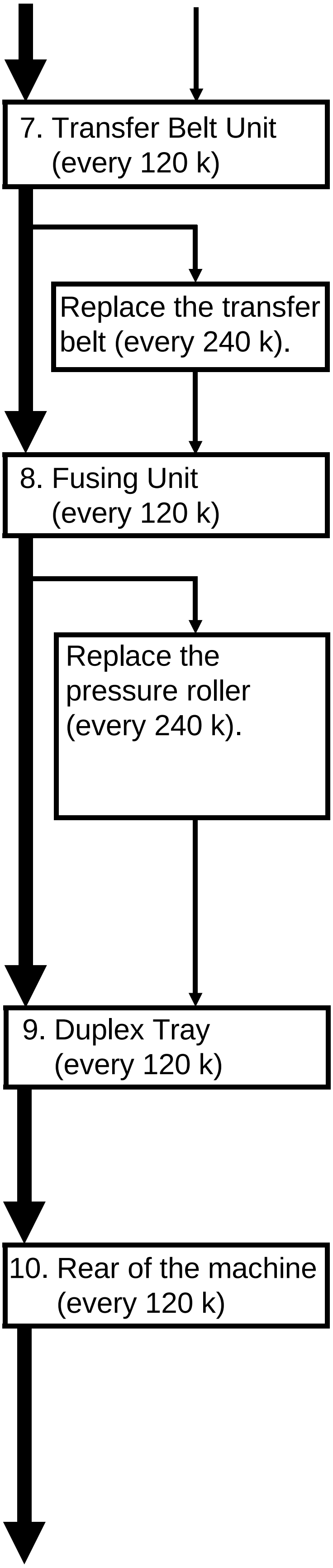
1. Remove the old developer.
2. Clean the development unit and seals.
3. Clean around the openings of the toner supply unit with a blower brush.
4. Pour in a pack of new developer.
5. Replace the development filter.

6. Paper Feed (every 120 k for each paper feed station)

1. Clean the paper guide plate.
2. Clean the paper feed, pick-up, separation, and relay rollers for each paper feed station, by-pass feed, and the LCT.
3. Replace the bottom plate pad for each paper feed station, by-pass feed, and the LCT.
4. Clean the registration rollers.

Replace pick-up, feed and separation rollers for each paper feed station, by-pass feed, and the LCT (every 240 k).

A214 only: Replace the separation torque limiter for the by-pass feed station (every 240 k).



7. Transfer Belt Unit (every 120 k)

Replace the transfer belt (every 240 k).

1. Remove the transfer belt and clean the used toner tank with a blower brush or vacuum cleaner.
2. Clean the transfer belt.
3. Replace the transfer belt cleaning blade.

8. Fusing Unit (every 120 k)

Replace the pressure roller (every 240 k).

1. Clean the entrance and exit guide plates
2. Inspect the thermistor, fusing lamps, hot and pressure roller bearings, antistatic brush, and cleaning roller bushings and oil supply roller one-way bushing.
3. Clean the pressure roller, cleaning roller, exit roller, and turn gate transport rollers.
4. Replace the hot roller strippers.
5. Replace the hot roller. Lubricate the flange with Grease Barrierta JFE 55/2.
6. Replace the cleaning roller.

9. Duplex Tray (every 120 k)

1. Inspect the mylars.
2. Replace the feed roller and the bottom plate pad.
3. Lubricate the clutch spring with Mobil Temp 78.

10. Rear of the machine (every 120 k)

1. Inspect the timing belts.

11. Exterior (every 120 k)

1. Clean the covers.

12. Development Unit (every 120 k)

Perform the following SP Modes in the following order.

1. SP2-214 TD Sensor Initial Setting
2. SP3-001 ID Sensor Initial Setting
3. SP3-112 Forced V_R Detection
4. * SP4-001 Exposure Lamp Voltage Adj.
5. SP4-201 Auto ADS Gain Adj.
6. * SP3-105 Forced V_L Detection

*: Perform these SP modes only if the exposure lamp has been replaced.

13. Make a Copy

Make a copy of an OS-A3 test chart at manual image density level 4.

14. SPECIAL TOOLS AND LUBRICANTS

✻ : New or modified items

Part Number	Description	Q'ty
A153 9001	Scanner Adjustment Tool	1
A153 9004	WIPING CLOTH (Drum Charge Roller Cloth)	1
5420 9516	Test Chart - OS-A3 (10 pcs/set)	1
5420 9507	Digital Multimeter	1
A008 9502	Silicone Grease - G40M	1
5442 9103	Launa Oil	1
5447 9078	Heat Resistant Grease - MT-78	1
5203 9501	Grease - 501	1
✻ 5442 9101	Setting Powder	1
✻ A028 9300	Grease Barrierta JFE 55/2	1

15. SC CODE DESCRIPTIONS

✻ Only the following SC codes have been changed or added from the base copier.

E720 - Timing Sensor (Roller Drive) Output Error (A555/A658)

- Definition - [B]

When the roller drive/transport motor is turning, the timing sensor takes over 500 ms to change.

- Possible Causes -

- The timing sensor is defective.
- The roller drive/transport motor is defective.
- The main control board is defective.

E721 - Timing Sensor (Bin Lift) Output Error (All sorters)

- Definition - [C]

When the bin lift/bin drive motor is turning, the timing sensor takes over 250 ms to change.

- Possible Causes -

- The timing sensor is defective.
- The bin lift/bin drive motor is defective.
- The main control board is defective.

E722 - Jogger Home Position Sensor Output Error (A555/A658)

- Definition- [C]

- When the jogger bar moves forward, the home position sensor takes over 100 ms to be deactivated.
- When the jogger bar moves backward, the home position sensor takes over 800 ms to be activated.

- Possible Causes -

- The jogger home position sensor is defective.
- The jogger motor is defective.
- The main control board is defective.

E723 - Grip Home Position Sensor Output Error (A555/A658)

- Definition- [C]

- When the grip motor rotates forwards, the grip home position sensor takes over 0.2 s to be deactivated.
- When the grip motor rotates in reverse, the grip home position sensor takes over 2.5 s to be deactivated.

- Possible Causes -

- The grip home position sensor is defective.
- The grip motor is defective.
- The main control board is defective.

E724 - Stapler Error (A555/A658)

- Definition- [C]

The stapler motor takes more than 800 ms for one staple operation (from home position to home position).

- Possible Causes -

- The stapler is defective.
- The main control board is defective.

E940 - Main Switch Error

- Definition - [A]

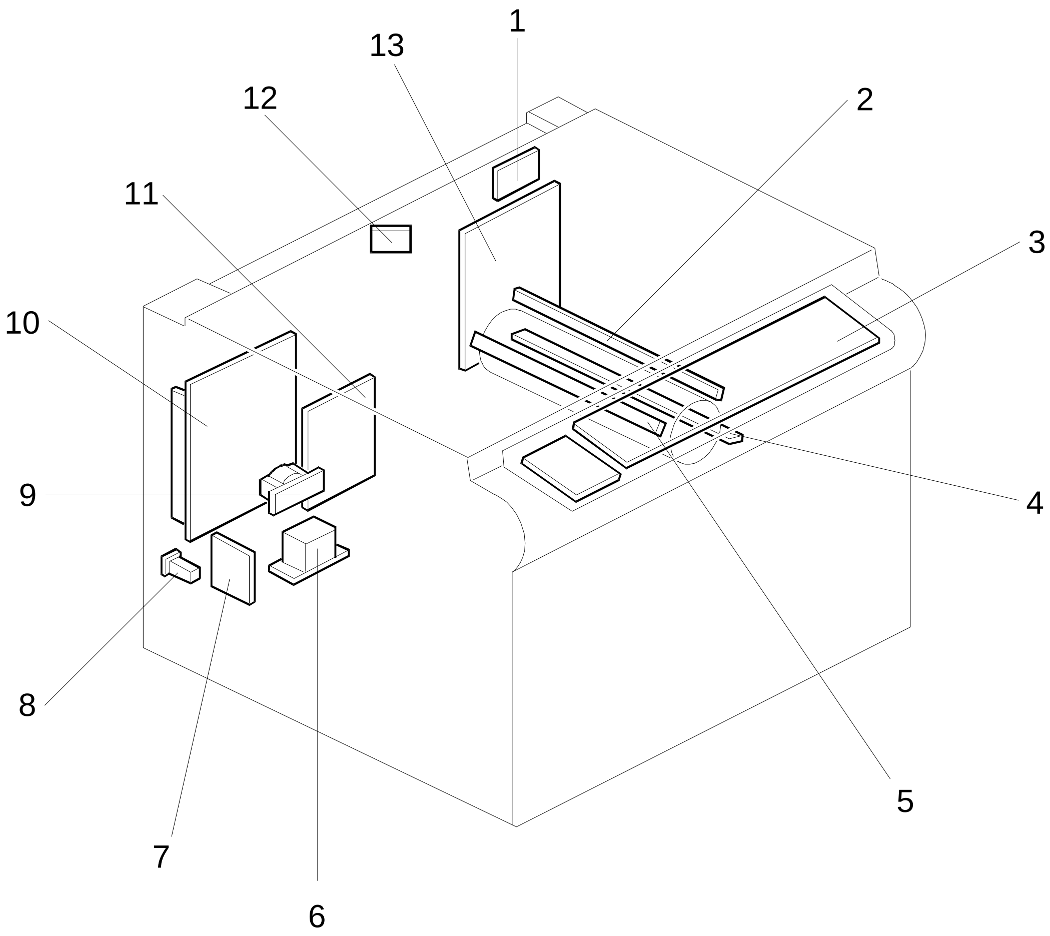
The detection mechanism is as follows:

- The machine reaches the auto-off time.
- The solenoid mounted inside the main switch turns on for 3 seconds.
- If the main switch does not turn off, the solenoid is turned off for 1 seconds.
- The solenoid is once again turned on for 3 seconds.
- If the main switch does not turn off at this point, the solenoid turns off and E940 lights.

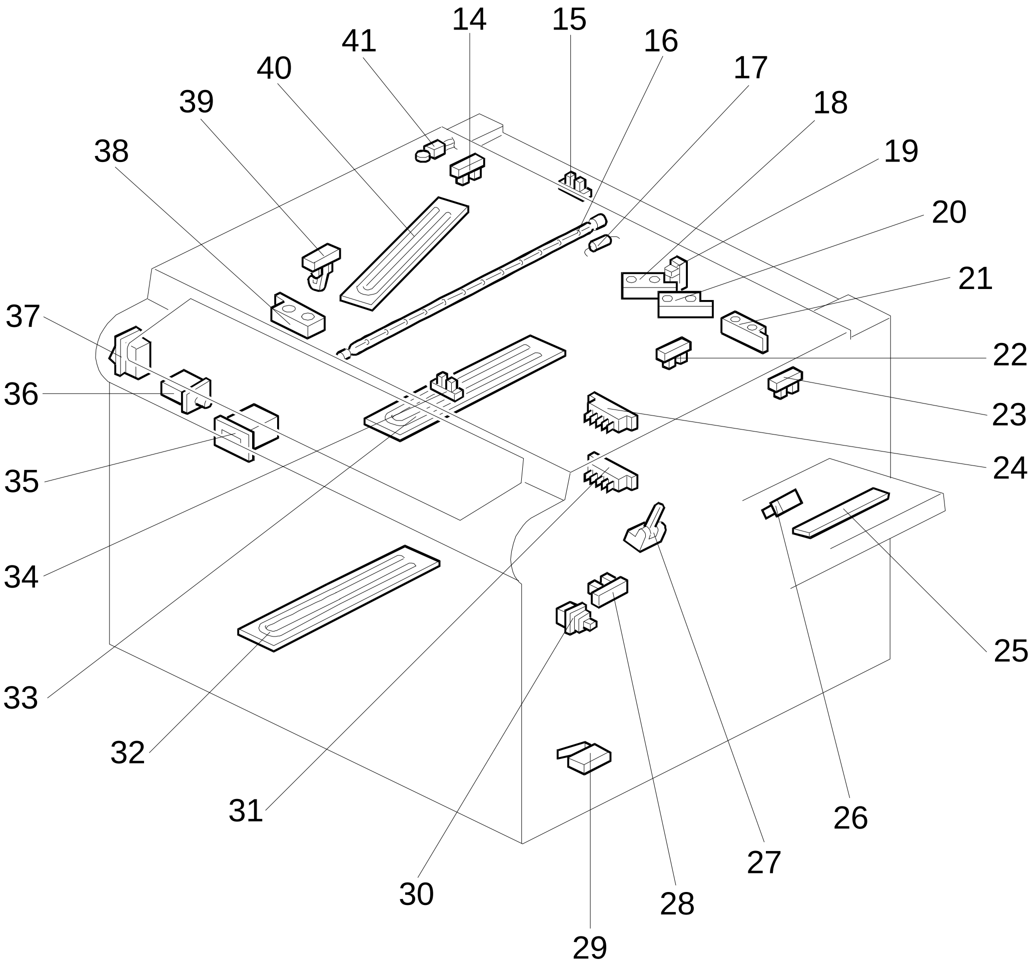
- Possible Causes -

- The main switch is defective.
- The main control board is defective.

COPIER ELECTRICAL COMPONENT LAYOUT

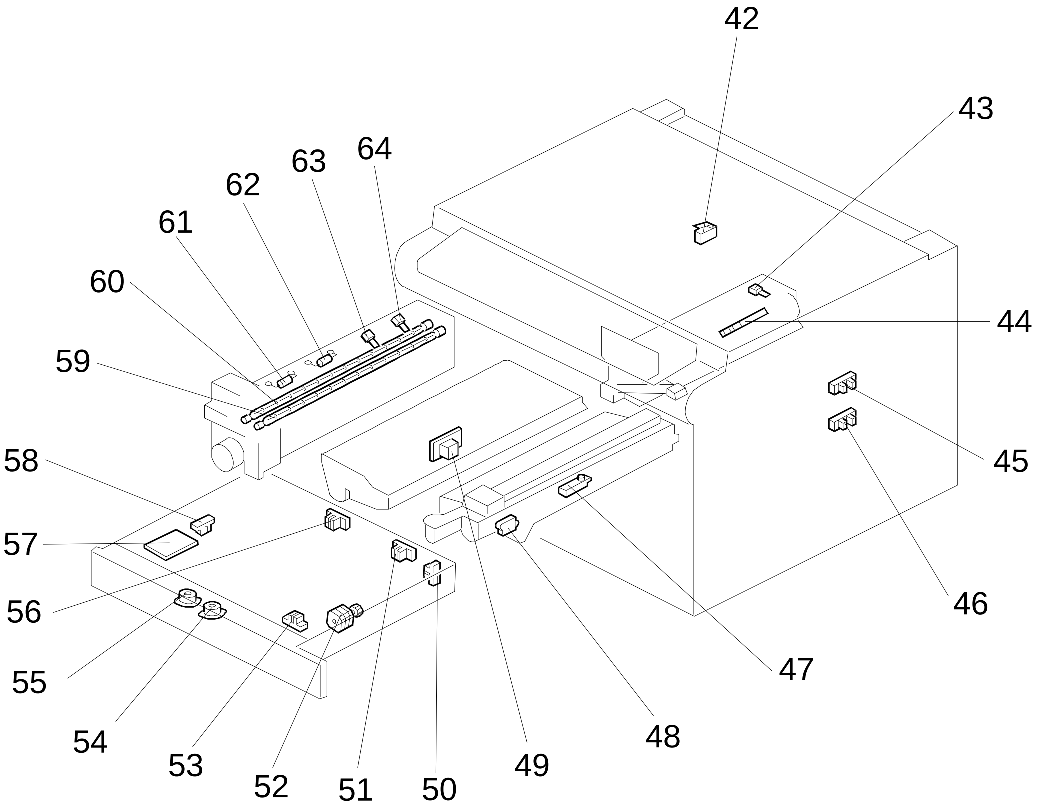

1
13
12
2
11
3
10
9
4
8
5
7
6

A212S500.wmf

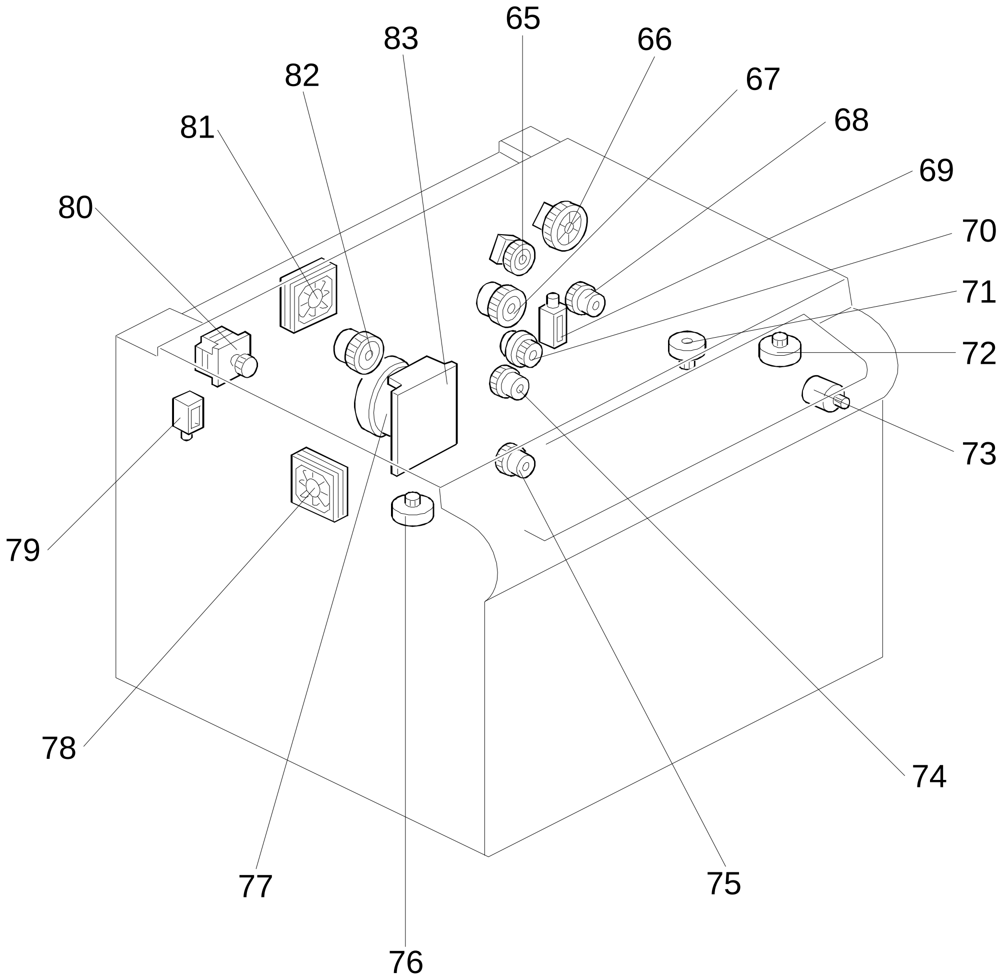


14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41

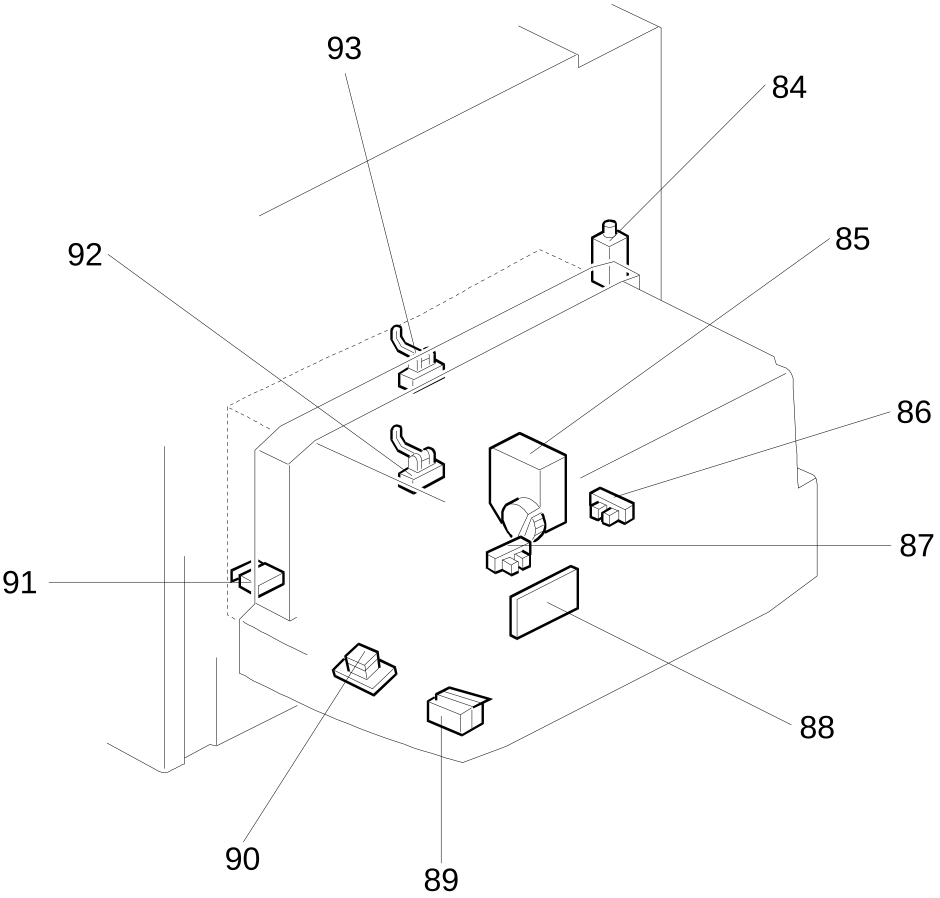
A212S501.wmf


42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64

A212S502.wmf


65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83

A212S503.wmf


93
84
92
85
86
87
91
88
90
89

A212S504.wmf

Description	Index No.	P to P Location
CB High Voltage Supply Board (PCB5)	1	K12
Erase Lamp (L6)	2	A4
Operation Panel Board (PCB7)	3	A6
Pre-transfer Lamp (L4)	4	Q9
Quenching Lamp (L5)	5	Q8
Transformer (220 ~ 240 V machines only) (TR1)	6	C10
Nose Filter Board (220 ~ 240 V machines only) (PCB8)	7	B9
Circuit Breaker (220 ~ 240 V machines only) (CB1)	8	A9
Choke Coil (CC1)	9	H12
DC Power Supply Board (PCB3)	10	I10
AC Drive Board (PCB2)	11	E11
Auto Image Density Sensor (ADS Sensor) (S22)	12	G9
Main Control Board (PCB1)	13	K7

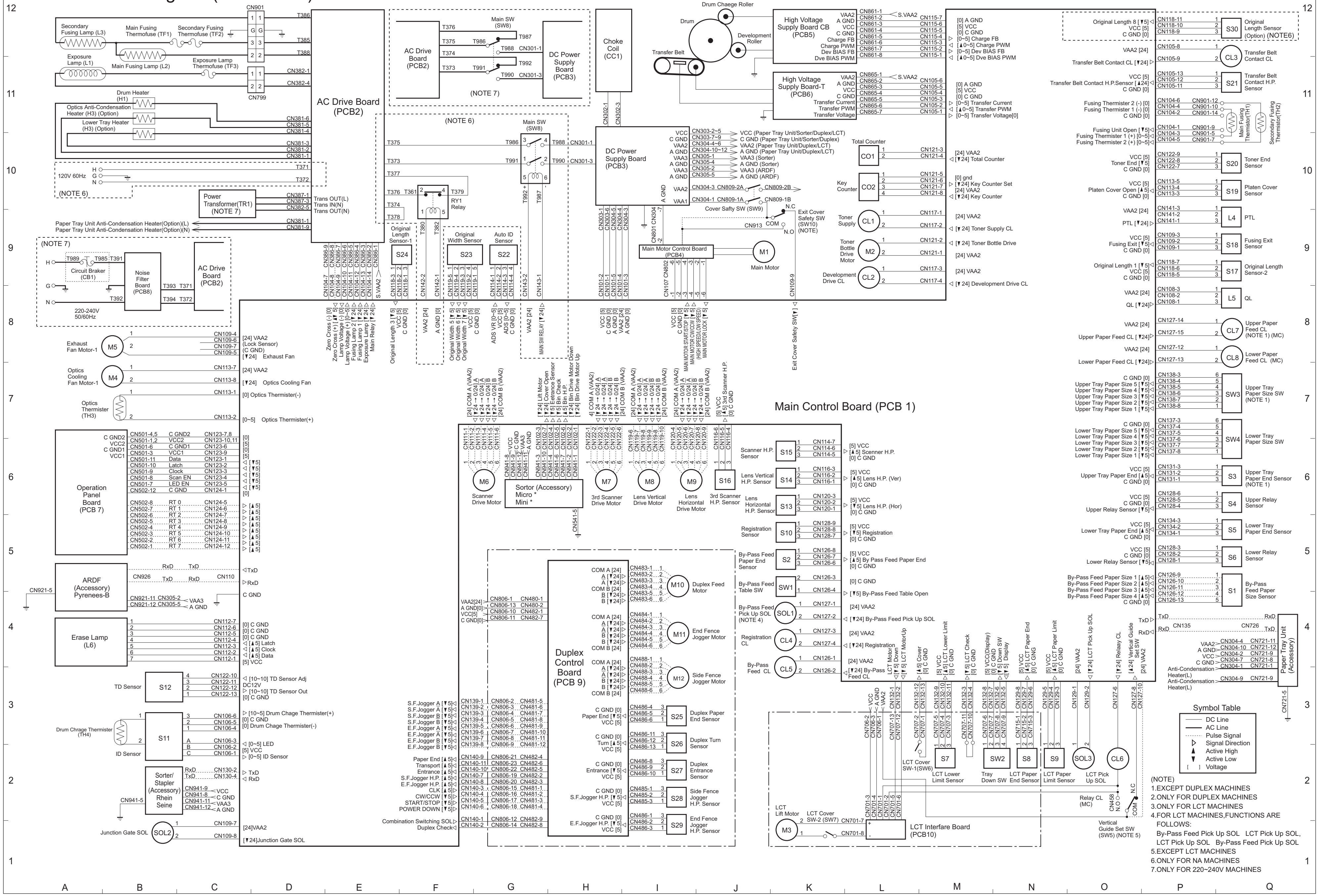
Description	Index No.	P to P Location
Scanner HP Sensor (S15)	14	K6
Platen Cover Sensor (S19)	15	Q10
Exposure Lamp (L1)	16	A11
Exposure Lamp Thermofuse (TF3)	17	C11
Original Length Sensor-1 (S24)	18	F9
Lens Vertical HP Sensor (S14)	19	K6
Original Length Sensor-2 (S17)	20	Q9
Original Length Sensor (Option for N. American models) (S30)	21	Q12
Transfer Belt Contact HP Sensor (S21)	22	Q11
3rd Scanner HP Sensor (S16)	23	J6
Upper Tray Paper Size Switch (A212 machine only) (SW3)	24	Q7
By-pass Feed Paper Width Sensor (S1)	25	Q5
LCT Upper Limit Sensor (A214 machine only) (S9)	26	N2
Registration Sensor (S10)	27	K5
By-pass Feed Paper End Sensor (S2)	28	K5
Vertical Guide Set Switch (A212 machine only) (SW5)	29	O2
By-pass Feed Table Switch (SW1)	30	K5
Lower Tray Paper Size Switch (SW4)	31	Q7
Lower Tray Heater (option) (H3)	32	B10
Drum Heater (H1)	33	B11
Lens Horizontal HP Sensor (S13)	34	K6
Total Counter (CO1)	35	L10
Front Cover Safety Switch (SW9)	36	J10
Main Switch (SW8)	37	G10
Original Width Sensor (S23)	38	F9
Fusing Exit Sensor (S18)	39	Q9
Optics Anti-condensation Heater (option) (H2)	40	B11
Optics Thermistor (TH3)	41	B7

Description	Index No.	P to P Location
Exit Cover Safety Switch (A214 machine only) (SW10)	42	K9
Drum Charge Thermistor (TH4)	43	B3
Image Density Sensor (ID) (S11)	44	Q5
Upper Tray Paper End Sensor (A212 machine only) (S3)	45	Q6
Lower Tray Paper End Sensor (S5)	46	Q5
Toner Density Sensor (TD) (S12)	47	B3
Toner End Sensor (S20)	48	Q10
T High Voltage Supply Board (PCB6)	49	K11
Duplex Paper End Sensor (A214 machine only) (S25)	50	I3
Duplex Turn Sensor (A214 machine only) (S26)	51	I2
Duplex Feed Motor (A214 machine only) (M10)	52	I5
Side Fence Jogger HP Sensor (A214 machine only) (S28)	53	I2
Side Fence Jogger Motor (A214 machine only) (M12)	54	I3
End Fence Jogger Motor (A214 machine only) (M11)	55	I4
Duplex Entrance Sensor (A214 machine only) (S27)	56	I2
Duplex Control Board (A214 machine only) (PCB9)	57	H4
End Fence Jogger HP Sensor (A214 machine only) (S29)	58	I1
Main Fusing Lamp (L2)	59	B11
Secondary Fusing Lamp (L3)	60	A12
Secondary Fusing Thermofuse (TF2)	61	C12
Main Fusing Thermofuse (TF1)	62	B12
Main Fusing Thermistor (TH1)	63	Q11
Secondary Fusing Thermistor (TH2)	64	Q11

Description	Index No.	P to P Location
Development Clutch (CL2)	65	L9
Toner Supply Clutch (CL1)	66	L9
Registration Clutch (CL4)	67	K4
By-pass Feed Clutch (CL5)	68	K3
A214 machine: LCT/By-Pass Pick up Solenoid A212 machine: By-Pass Pick up Solenoid (SOL1)	69	K4
Relay Clutch (CL6)	70	O2
Lens Horizontal Drive Motor (M9)	71	I6
3rd Scanner Drive Motor (M7)	72	H6
Toner Bottle Drive Motor (M2)	73	L9
Upper- Paper Feed Clutch (A212 machine only) (CL7)	74	Q8
Lower Paper Feed Clutch (CL8)	75	Q8
Lens Vertical Drive Motor (M8)	76	I6
Main Motor (M1)	77	J9
Exhaust Fan Motor 1 (M5)	78	B8
Junction Gate Solenoid (A214 machine only) (SOL2)	79	B1
Scanner Drive Motor (M6)	80	G6
Optics Cooling Fan Motor 1 (M4)	81	B7
Transfer Belt Contact Clutch (CL3)	82	Q12
Main Motor Control Board (PCB4)	83	I9

Description	Index No.	P to P Location
LCT Pick-up Solenoid (A214 machine only) (SOL3)	84	O2
LCT Lift Motor (A214 machine only) (M3)	85	K1
LCT Lower Limit Sensor (A214 machine only) (S7)	86	M2
LCT Paper End Sensor (A214 machine only) (S8)	87	N2
LCT Interface Board (A214 machine only) (PCB10)	88	L1
LCT Cover Switch-2 (A214 machine only) (SW7)	89	K1
Tray Down Switch (A214 machine only) (SW2)	90	N2
LCT Cover Switch-1 (A214 machine only) (SW6)	91	M2
Lower Relay Sensor (S6)	92	Q5
Upper Relay Sensor (S4)	93	Q6

Point To Point Diagram (A212/A214)


A B C D E F G H I J K L M N O P Q
12 11 10 9 8 7 6 5 4 3 2 1
CN901
Secondary Fusing Lamp (L3)
Main Fusing Thermofuse (TF1)
Secondary Fusing Thermofuse (TF2)
Exposure Lamp (L1)
Main Fusing Lamp (L2)
Exposure Lamp Thermofuse (TF3)
CN799
Drum Heater (H1)
Optics Anti-Condensation Heater (H3) (Option)
Lower Tray Heater (H3) (Option)
AC Drive Board (PCB2)
120V 60Hz
(NOTE 6)
Power Transformer(TR1) (NOTE 7)
Trans OUT(L)
Trans IN(N)
Trans OUT(N)
Paper Tray Unit Anti-Condensation Heater(Option)(L)
Paper Tray Unit Anti-Condensation Heater(Option)(N)
(NOTE 7)
Circuit Braker (CB1)
Noise Filter Board (PCB8)
220-240V 50/60Hz
AC Drive Board (PCB2)
DC Power Supply Board (PCB3)
Main SW (SW8)
(NOTE 7)
(NOTE 6)
RY1 Relay
Choke Coil (CC1)
DC Power Supply Board (PCB3)
Cover Safty SW (SW9)
Exit Cover Safety SW (SW10) (NOTE)
Main Motor Control Board (PCB4)
M1 Main Motor
Drum Chaege Roller
Drum
Development Roller
Transfer Belt
High Voltage Supply Board CB (PCB5)
High Voltage Supply Board-T (PCB6)
Total Counter CO1
Key Counter CO2
Toner Supply CL1
Toner Bottle Drive Motor M2
Development Drive CL CL2
Original Length Sensor-1 S24
Original Width Sensor S23
Auto ID Sensor S22
Exhaust Fan Motor-1 M5
Optics Cooling Fan Motor-1 M4
Optics Thermister (TH3)
Operation Panel Board (PCB 7)
ARDF (Accessory) Pyrenees-B
Erase Lamp (L6)
TD Sensor S12
Drum Chrage Thermister (TH4)
ID Sensor S11
Sorter/ Stapler (Accessory) Rhein Seine
Junction Gate SOL SOL2
Main Control Board (PCB 1)
Scanner Drive Motor M6
Sortor (Accessory) Micro * Mini *
3rd Scanner Drive Motor M7
Lens Vertical Drive Motor M8
Lens Horizontal Drive Motor M9
3rd Scanner H.P. Sensor S16
Scanner H.P. Sensor S15
Lens Vertical H.P. Sensor S14
Lens Horizontal H.P. Sensor S13
Registration Sensor S10
By-Pass Feed Paper End Sensor S2
By-Pass Feed Table SW SW1
By-Pass Feed Pick Up SOL (NOTE 4) SOL1
Registration CL CL4
By-Pass Feed CL CL5
Duplex Control Board (PCB 9)
Duplex Feed Motor M10
End Fence Jogger Motor M11
Side Fence Jogger Motor M12
Duplex Paper End Sensor S25
Duplex Turn Sensor S26
Duplex Entrance Sensor S27
Side Fence Jogger H.P. Sensor S28
End Fence Jogger H.P. Sensor S29
Original Length Sensor (Option) (NOTE6) S30
Transfer Belt Contact CL CL3
Transfer Belt Contact H.P. Sensor S21
Main Fusing Thermistor(TH1)
Secondary Fusing Thermistor(TH2)
Toner End Sensor S20
Platen Cover Sensor S19
PTL L4
Fusing Exit Sensor S18
Original Length Sensor-2 S17
QL L5
Upper Paper Feed CL (NOTE 1) (MC) CL7
Lower Paper Feed CL (MC) CL8
Upper Tray Paper Size SW (NOTE 1) SW3
Lower Tray Paper Size SW SW4
Upper Tray Paper End Sensor (NOTE 1) S3
Upper Relay Sensor S4
Lower Tray Paper End Sensor S5
Lower Relay Sensor S6
By-Pass Feed Paper Size Sensor S1
Paper Tray Unit (Accessory)
LCT Lift Motor M3
LCT Cover SW-2 (SW7)
LCT Interfare Board (PCB10)
LCT Cover SW-1(SW6)
LCT Lower Limit Sensor S7
Tray Down SW SW2
LCT Paper End Sensor S8
LCT Paper Limit Sensor S9
LCT Pick Up SOL SOL3
Relay CL (MC) CL6
Vertical Guide Set SW (SW5) (NOTE 5)

Symbol Table
- DC Line
- AC Line
- Pulse Signal
- ▷ Signal Direction
- ▲ Active High
- ▼ Active Low
- [ ] Voltage

(NOTE)
1. EXCEPT DUPLEX MACHINES
2. ONLY FOR DUPLEX MACHINES
3. ONLY FOR LCT MACHINES
4. FOR LCT MACHINES,FUNCTIONS ARE FOLLOWS:
   By-Pass Feed Pick Up SOL → LCT Pick Up SOL,
   LCT Pick Up SOL → By-Pass Feed Pick Up SOL
5. EXCEPT LCT MACHINES
6. ONLY FOR NA MACHINES
7. ONLY FOR 220~240V MACHINES

A161/A162 COPIER

SERVICE MANUAL

The A161 copier is based on the A157 copier.
The A162 copier is based on the A160 copier.

Only the differences from the A157/A160 copier are described in the following pages. Refer to the A157/A160 copier service manual regarding the other information.

1. SPECIFICATIONS

NOTE: Only items marked with ✻ are different from A157 and A160 copiers.

Configuration:	Desktop
Copy Process:	Dry electrostatic transfer system
Originals:	Sheet/Book
Original Size:	Maximum A3/11" x 17"
Copy Paper Size:	Maximum A3/11" x 17" (Paper trays) Minimum A5/81/2" x 51/2" sideways (Paper trays) A4/11" x 81/2" sideways (LCT) A6/51/2" x 81/2" lengthwise (By-pass)
Duplex Copying:	Maximum A3/11" x 17" Minimum A5/81/2" x 51/2" (sideways)
Copy Paper Weight:	Paper tray: 64 ~ 90 g/m^2, 17 ~ 24 lb By-pass: 52 ~ 157 g/m^2, 14 ~42 lb LCT: 52 ~ 128 g/m^2, 14 ~ 34 lb Duplex copying: 64 ~ 105 g/m^2, 17 ~ 24 lb
Reproduction Ratios:	4 Enlargement and 6 Reduction

	A4/A3 Version	**LT/DLT Version**
Enlargement	200%	200%
	141%	155%
	122%	129%
	115%	121%
Full size	100%	100%
Reduction	93%	93%
	82%	85%
	75%	77%
	71%	74%
	65%	65%
	50%	50%

Power Source:

120V/60Hz:
More than 12 A (for North America)
220V ~ 240V/50Hz:
More than 7 A (for Europe)
220V/50Hz:
More than 7 A (for Asia)
110V/60Hz:
More than 14 A (for Taiwan)
220V/60Hz:
More than 7 A (for Saudi Arabia, Philippines)

✻ Power Consumption:

		Copier Only	Full System
Maximum		1.45 KW	1.50 KW
Copying		0.64 KW	0.72 KW
Warm-up		0.95 KW	0.97 KW
Stand-by		0.15 KW	0.17 KW
Energy Saver	1	0.14 KW	0.16 KW
	2	0.12 KW	0.13 KW
	3	0.09 KW	0.10 KW
	4	0.07 KW	0.08 KW
	5	0.05 KW	0.06 KW
Auto Off		0.02 KW	0.04 KW

NOTE: 1) Full System: Copier + ADF + Paper Tray Unit + 10 Bin S/S
2) Energy Saver: See SP1-105-002
3) Auto Off: See SP5-305

Noise Emission:

	Copier Only	Full System*
1. Sound Power Level		
Copying	61 dB(A) (LWA)	67 dB(A) (LWA)
Warm-up	39 dB(A) (LWA)	40 dB(A) (LWA)
Stand-by	39 dB(A) (LWA)	40 dB(A) (LWA)
2. Sound Pressure Level at the operator position		
Copying	54 dB(A) (LPA)	56 dB(A) (LPA)
Warm-up	32 dB(A) (LPA)	27 dB(A) (LPA)
Stand-by	32 dB(A) (LPA)	27 dB(A) (LPA)

NOTE: The above measurements were made in accordance with ISO 7779.
* : Full System: Copier + ADF + Paper Tray Unit +10 Bin S/S.

Dimensions:

	Width	Depth	Height
A161 copier	900 mm (35.5")	655 mm (25.8")	606 mm (23.9")
A162 copier	1128 mm (44.5")	655 mm (25.8")	606 mm (23.9")

Measurement Conditions
1) With by-pass feed table closed
2) With platen cover and copy tray attached
3) With LCT cover closed

Weight:

	Weight
A161 copier	About 67 kg (147.7 lb)
A162 copier	About 80 kg (176.4 lb)

Zoom: From 50% to 200% in 1% steps

✻ Copying Speed (copies/minute):
22 copies/minute (A4/11" x 81/2" sideways)
12 copies/minute (A3/11" x 17")

✻ Warm-Up Time Less than 60 seconds (at 20°C/68°F)

First Copy Time:

Paper Feed Station	A4/11" x 81/2" (sideways)
1st Tray	5.9 s (except for A162)
2nd Tray	6.6 s
By-pass	5.6 s
LCT	5.9 s

NOTE: In the A162 copier, the 2nd tray in the above table is called the 1st tray (see Installation - Paper Feed Station Definition of the base copier service manual).

Copy Number Input: Ten-key pad, 1 to 999 (count up or count down)

Manual Image Density Selection: 7 steps

Automatic Reset: 1 minute is the standard setting; it can be changed to a maximum of 999 seconds or no auto reset by SP mode.

Copy Paper Capacity:

	Paper Tray	**By-pass Feed**	**LCT**
A161 copier	About 250 sheets x 2	About 40 sheets	–
A162 copier	About 250 sheets x 1	About 40 sheets	About 1000 sheets

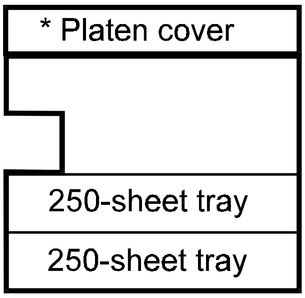
Duplex Tray Capacity [A162]:	50 sheets (30 sheets for A3/11"x17" 81 ~ 105 g/m^2, 21.5 ~ 27.9 lb paper)
Toner Replenishment:	Cartridge exchange (415 g/cartridge)
✻ Optional Equipment (Sales items):	• Platen cover (except for A161 destination code -29 and -59 machines) • Document feeder • 10-bin sorter stapler • 20-bin mini sorter • 10-bin micro sorter • Sorter adapter (required when installing a 10-bin sorter stapler or 20-bin mini sorter) • 1000-sheet tray unit (two 500-sheet trays) • 500-sheet tray unit (two 250-sheet trays)
Optional Equipment (Service items)	• Original length sensor for 11" x 15" size paper (only for LT/DLT version) • Tray heater • Optical anti-condensation heater • ADS sensor for particular types of red original
Optional Equipment (To be procured locally):	• Key counter

2. MACHINE CONFIGURATION

2.1 COPIER

- A161 -

Two 250-sheet trays

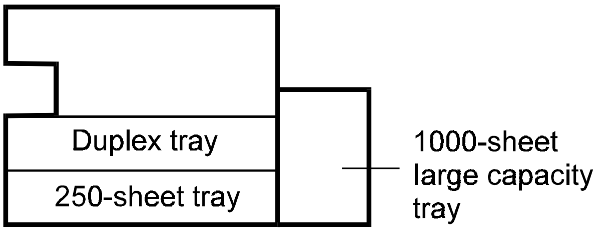

* Platen cover
250-sheet tray
250-sheet tray

A161V500.wmf

*: Only for destination code -29 and -59 machines.

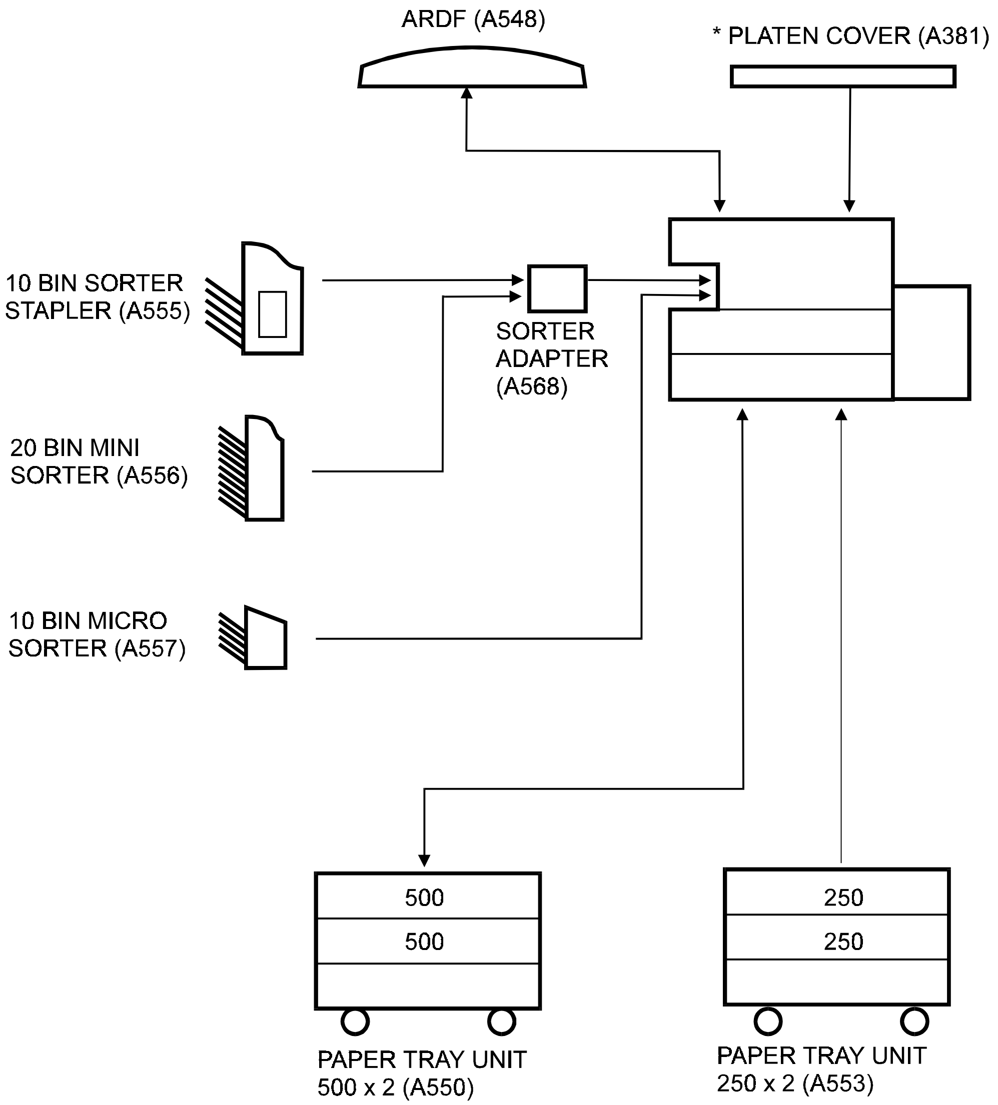
- A162 -

A 250-sheet tray
A duplex tray
A 1000-sheet large capacity tray


Duplex tray
250-sheet tray
1000-sheet large capacity tray

A161V501.wmf

2.2 OPTIONAL EQUIPMENT


ARDF (A548)
* PLATEN COVER (A381)
10 BIN SORTER STAPLER (A555)
SORTER ADAPTER (A568)
20 BIN MINI SORTER (A556)
10 BIN MICRO SORTER (A557)
500
500
250
250
PAPER TRAY UNIT 500 x 2 (A550)
PAPER TRAY UNIT 250 x 2 (A553)

A161V502.wmf

*: Except for A161 destination code -29 and -59 machines.

3. COPIER ACCESSORY CHECK

The following decals are not included as accessories with the copier, due to catalog specifications.

- Optional Zoom (10-Key) Function Decal
- Optional Margin Adjustment Function Decal

4. ELECTRICAL COMPONENTS

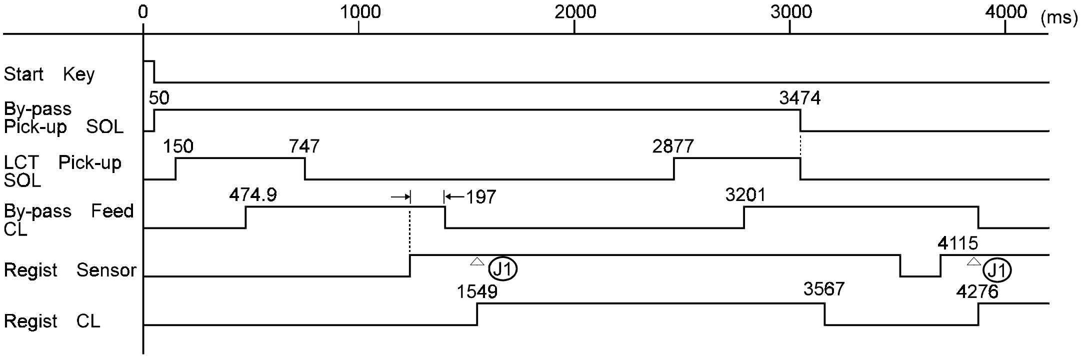
The electrical components are the same as the A157/A160 copier except for the "Auto Response Sensor" mentioned below which is not included in the A161/A162 copier.

Symbol	Index.	Description	Note
S23	43	Auto Response Sensor	Returns the operation panel display and exits from the energy saver mode.

5. PAPER FEED AND MISFEED DETECTION TIMING

The timing chart for a single copy (A4 sideways) is the same as that of the A157/A160 copier.

A4 sideways; two copies of a single-page original



A161V503.wmf

J1: Checks whether the registration sensor is activated when the registration clutch is turned on.

6. MAIN FUSING LAMP INTERCHANGEABILITY

The main fusing lamp for the A161/A162 is different from that for the A157/A160. The total span of all the filaments has been expanded for the A161/A162 copier to compensate for the difference in the cpm and the warm-up time.

In other words, there is more overlap of the main and secondary fusing lamp filaments in the A161/A162 compared with the A157/A160 copier. This allows a faster heat up time around the edges of the hot roller.

To distinguish between the two types of lamp, the lamp connector color at the front side is different.

A161/A162 - Blue
A157/A160 - White

NOTE: Do not confuse the fusing lamps for the A161/A162 and A157/A160 copiers. If an A161/A162 lamp is installed in a A157/A160 copier, faster warm-up may be achieved, but fusing problems may occur during multi-copy runs due to a lack of heat for the faster cpm.

The secondary fusing lamp is the same as for the base copier.

IMPORTANT SAFETY NOTICES

PREVENTION OF PHYSICAL INJURY

1. Before disassembling or assembling parts of the copier and peripherals, make sure that the copier power cord is unplugged.
2. The wall outlet should be near the copier and easily accessible.
3. Note that some components of the copier and the paper tray unit are supplied with electrical voltage even if the main switch is turned off.
4. If any adjustment or operation check has to be made with exterior covers off or open while the main switch is turned on, keep hands away from electrified or mechanically driven components.
5. The inside and the metal parts of the fusing unit become extremely hot while the copier is operating. Be careful to avoid touching those components with your bare hands.

HEALTH SAFETY CONDITIONS

1. Never operate the copier without the ozone filter installed.
2. Always replace the ozone filter with the specified one at the specified interval.
3. Toner and developer are non-toxic, but if you get either of them in your eyes by accident, it may cause temporary eye discomfort. Try to remove with eye drops or flush with water as first aid. If unsuccessful, get medical attention.

OBSERVANCE OF ELECTRICAL SAFETY STANDARDS

1. The copier and its peripheral must be installed and maintained by a customer service representative who has completed the training course on those models.

⚠ CAUTION

The RAM pack has a lithium battery which can explode if handled incorrectly, replace only with same RAM pack. Do not recharge, or burn this battery. Used RAM pack must be handled in accordance with local regulations.

SAFETY AND ECOLOGICAL NOTES FOR DISPOSAL

1. Do not incinerate the toner cartridge or the used toner. Toner dust may ignite suddenly when exposed to open flame.
2. Dispose of used toner, developer, and organic photoconductors according to local regulations. (These are non-toxic supplies.)
3. Dispose of replaced parts in accordance with local regulations.

Table of Contents

1. OVERALL MACHINE INFORMATION

1. SPECIFICATIONS 1-1

2. COPY PROCESSES AROUND THE DRUM 1-4

3. COPY PROCESS CONTROL. 1-6

4. MECHANICAL COMPONENT LAYOUT 1-7

5. DRIVE LAYOUT 1-8

6. ELECTRICAL COMPONENT DESCRIPTIONS. 1-9

7. MAJOR DIFFERENCES BETWEEN THE A110 AND A173 MODELS. 1-12

2. DETAILED SECTION DESCRIPTIONS

1. DRUM 2-1

1.1 OPC DRUM CHARACTERISTICS 2-1

1.2 DRUM UNIT 2-2

2. DRUM CHARGE 2-3

2.1 OVERVIEW. 2-3

2.2 CHARGE CORONA WIRE CLEANER MECHANISM 2-4

2.3 CHARGE CORONA CIRCUIT 2-5

2.4 GRID VOLTAGE CORRECTION (VR CORRECTION) 2-6

2.5 GRID VOLTAGE CONTROL 2-7

2.5.1 Image Density Control. 2-7

2.5.2 Vr Detection 2-7

2.5.3 Toner Density Detection 2-7

3. OPTICS 2-8

3.1 OVERVIEW. 2-8

3.2 SCANNER DRIVE 2-9

3.3 LENS DRIVE. 2-10

3.3.1 Lens Drive 2-10

3.3.2 Lens Positioning 2-11

3.4 4TH AND 5TH MIRROR DRIVE 2-12

3.4.1 Drive 2-12

3.4.2 Positioning. 2-12

3.5 AUTOMATIC IMAGE DENSITY DETECTION 2-13

3.6 EXPOSURE LAMP VOLTAGE CORRECTION 2-14

3.6.1 V_L Correction. 2-14

3.6.2 Reproduction Ratio Correction 2-14

3.7 EXPOSURE LAMP VOLTAGE CONTROL 2-15

3.7.1 Base Lamp Voltage. 2-15

3.7.2 Image Density Setting Factor (Manual ID Mode Only) 2-15

3.7.3 V_L Correction Factor 2-16

3.7.4 Reproduction Ratio Correction Factor. 2-16

3.8 EXPOSURE LAMP CONTROL. 2-17

4. ERASE 2-18

4.1 OVERVIEW. 2-18

4.1.1 Lead Edge Erase 2-19

4.1.2 Side Erase. 2-19

4.1.3 Trail Edge Erase 2-20

4.1.4 Editing Mode Erase. 2-20

4.1.5 Erase During Detection Cycles 2-21

5. DEVELOPMENT 2-22

5.1 OVERVIEW. 2-22

5.2 CROSS-MIXING 2-23

5.3 DEVELOPMENT BIAS FOR IMAGE DENSITY CONTROL 2-24

5.3.1 Base Bias Voltage Factor in Manual Image Density Control 2-24

5.3.2 Base Bias Voltage Factor in Automatic Image Density Control 2-25

5.3.3 Base Bias Voltage Adjustment Factor. 2-26

5.3.4 Vr Correction Factor 2-26

5.4 TONER SAVER MODE 2-27

5.5 DEVELOPMENT BIAS CIRCUIT 2-28

3. INSTALLATION

1. INSTALLATION REQUIREMENTS 3-1

1.1 ENVIRONMENT 3-1

1.2 MACHINE LEVEL 3-1

1.3 MINIMUM SPACE REQUIREMENTS 3-2

1.4 POWER REQUIREMENTS 3-2

2. INSTALLATION PROCEDURE 3-3

2.1 ACCESSORY CHECK 3-3

2.2 COPIER INSTALLATION 3-4

2.3 CASSETTE MODIFICATION 3-10

2.4 KEY COUNTER HOLDER INSTALLATION (Option) 3-11

2.5 TONER OVERFLOW SENSOR INSTALLATION (Option). 3-12

2.6 PRE-TRANSFER LAMP (PTL) INSTALLATION (Option). 3-13

2.7 OPTICS ANTI-CONDENSATION HEATER INSTALLATION (Option). 3-14

4. SERVICE TABLES

1. SERVICE REMARKS 4-1

1.1 GENERAL CAUTION 4-1

1.2 DRUM AND DRUM UNIT 4-1

1.3 CHARGE CORONA 4-2

1.4 OPTICS. 4-2

1.5 DEVELOPMENT UNIT 4-3

1.6 TONER SUPPLY 4-4

1.7 TRANSFER AND SEPARATION 4-4

1.8 CLEANING UNIT 4-4

1.9 FUSING UNIT 4-5

1.10 PAPER FEED 4-5

1.11 DOCUMENT FEEDER 4-5

1.12 SORTER 4-5

1.13 OTHERS 4-6

2. SERVICE PROGRAM MODE 4-7

2.1 SERVICE PROGRAM MODE OPERATION 4-7

2.1.1 Service Program Access Procedure 4-7

2.1.2 Change Adjustment Values or Modes. 4-9

2.1.3 Memory Reset Procedures 4-9

2.2 SERVICE PROGRAM MODE TABLE 4-12

2.3 SP-8 SENSOR/SWITCH DATA CHECK 4-24

2.4 SP-9 ELECTRICAL COMPONENT CHECK. 4-25

2.5 MISFEED LOCATION INDICATOR 4-26

2.5.1 Misfeed Indication 4-26

2.5.2 Misfeed Recovery 4-27

3. SERVICE TABLES 4-28

3.1 DIP SWITCHES 4-28

3.2 VARIABLE RESISTORS. 4-29

4. SPECIAL TOOLS AND LUBRICANTS 4-30

5. PREVENTIVE MAINTENANCE SCHEDULE 4-31

5.1 PM TABLE 4-31

5.2 EXPLANATION OF REGULAR PM 4-33

5.3 REGULAR PM PROCEDURE 4-35

5. REPLACEMENT AND ADJUSTMENT

1. EXTERIOR AND INNER COVERS. 5-1

1.1 EXTERIOR COVER REMOVAL 5-1

1.1.1 Front Door 5-1

1.1.2 Inner Cover 5-2

1.1.3 Right Cover 5-3

1.1.4 Rear Cover 5-3

1.1.5 Left Covers 5-3

1.1.6 Upper Cover 5-3

1.1.7 Operation Panel 5-3

2. OPTICS 5-4

2.1 EXPOSURE GLASS REMOVAL 5-4

2.2 1ST MIRROR REMOVAL 5-5

2.3 2ND AND 3RD MIRROR REMOVAL 5-7

2.4 4TH AND 5TH MIRROR REPLACEMENT 5-9

2.5 EXPOSURE LAMP REPLACEMENT 5-10

2.6 OPTICS THERMOFUSE REMOVAL 5-12

2.7 SCANNER DRIVE WIRE REPLACEMENT 5-13

  2.7.1 Wire Removal 5-13

  2.7.2 Wire Installation 5-14

2.8 SCANNER MOTOR REPLACEMENT 5-20

2.9 LENS MOTOR REPLACEMENT 5-21

2.10 LENS DRIVE WIRE INSTALLATION 5-22

2.11 4TH/5TH MIRROR MOTOR REPLACEMENT 5-23

3. DEVELOPMENT AND TONER SUPPLY 5-24

3.1 TONER SUPPLY UNIT REMOVAL 5-24

3.2 DEVELOPER REPLACEMENT 5-25

3.3 INLET SEAL REMOVAL 5-26

3.4 TONER SUPPLY CLUTCH REPLACEMENT 5-27

3.5 CLUTCH REMOVAL 5-28

  3.5.1 1st Paper Feed Clutch 5-28

  3.5.2 2nd Paper Feed Clutch 5-28

  3.5.3 Relay Roller Clutch/Registration Clutch 5-28

3.6 DEVELOPMENT BIAS VOLTAGE ADJUSTMENT (SP9-57) 5-29

4. CLEANING 5-30

4.1 CLEANING UNIT REMOVAL 5-30

4.2 CLEANING BLADE REPLACEMENT 5-31

4.3 USED TONER COLLECTION 5-32

4.4 ENTRANCE SEAL REPLACEMENT 5-33

5. PAPER FEED 5-34

5.1 1ST PAPER SIZE SWITCH REPLACEMENT 5-34

5.2 1ST PAPER END SENSOR REPLACEMENT 5-35
5.3 PAPER FEED ROLLER REPLACEMENT 5-36
5.4 FRICTION PAD REPLACEMENT. 5-37
5.5 2ND PAPER FEED ROLLER REPLACEMENT 5-38
5.6 2ND PAPER END SENSOR REPLACEMENT. 5-39
5.7 REGISTRATION SENSOR/REGISTRATION ROLLER REMOVAL. 5-40
5.8 1ST PAPER FEED PRESSURE ADJUSTMENT 5-44

6. AROUND THE DRUM. 5-45

6.1 DRUM REPLACEMENT 5-45
6.2 ID SENSOR REPLACEMENT 5-48
6.3 PICK-OFF PAWL REPLACEMENT 5-49
6.4 QUENCHING LAMP REMOVAL. 5-50
6.5 ERASE LAMP REMOVAL 5-51
6.6 CHARGE CORONA WIRE REPLACEMENT 5-52
6.7 CHARGE CORONA GRID REPLACEMENT 5-53
6.8 TRANSFER/SEPARATION CORONA WIRE REPLACEMENT 5-54
6.9 CORONA CURRENT ADJUSTMENT 5-55
  6.9.1 CHARGE CORONA CURRENT ADJUSTMENT (SP9-2). 5-57
  6.9.2 GRID VOLTAGE ADJUSTMENT (SP9-2) 5-59
  6.9.3 TRANSFER CORONA CURRENT ADJUSTMENT (SP9-5). 5-60
  6.9.4 SEPARATION CORONA CURRENT ADJUSTMENT (SP9-8). 5-61

7. FUSING 5-62

7.1 EXIT UNIT REMOVAL 5-62
7.2 FUSING LAMP REPLACEMENT 5-63
7.3 PRESSURE ROLLER REPLACEMENT. 5-64
7.4 HOT ROLLER REPLACEMENT. 5-66
7.5 FUSING THERMISTOR AND THERMOFUSE. 5-68
7.6 FUSING PRESSURE ADJUSTMENT 5-69
7.7 EXHAUST BLOWER MOTORS/EXIT SENSOR REPLACEMENT 5-70

8. OTHERS 5-71

8.1 OZONE FILTER REPLACEMENT 5-71

9. COPY QUALITY ADJUSTMENT 5-72

9.1 LIGHT INTENSITY ADJUSTMENT 5-73

9.2 UNEVEN EXPOSURE ADJUSTMENT. 5-74

9.3 BIAS VOLTAGE ADJUSTMENT. 5-75

9.4 TONER DENSITY ADJUSTMENT 5-76

9.5 FIXED TONER SUPPLY MODE SELECTION 5-76

9.6 TONER SUPPLY RATIO SELECTION. 5-76

9.7 VERTICAL MAGNIFICATION ADJUSTMENT 5-77

9.8 HORIZONTAL MAGNIFICATION ADJUSTMENT 5-77

9.9 FOCUS ADJUSTMENT 5-78

9.10 LEADING EDGE ERASE MARGIN ADJUSTMENT 5-79

9.11 REGISTRATION ADJUSTMENT 5-79

9.12 SIDE-TO-SIDE REGISTRATION ADJUSTMENT 5-80

9.13 4TH/5TH MIRROR HEIGHT ADJUSTMENT 5-82

6. TROUBLESHOOTING

1. COPY QUALITY 6-1

1.1 BLANK COPY (WHITE COPY). 6-1

1.2 DIRTY BACKGROUND 6-4

1.3 UNEVEN IMAGE DENSITY 6-7

1.4 VERTICAL BLACK BANDS 6-8

1.5 VERTICAL BLACK LINES 6-9

1.6 VERTICAL WHITE LINES OR BANDS–1 (DULL OR BLURRED) 6-10

1.7 VERTICAL WHITE LINES OR BANDS–2 (THIN, DISTINCT) 6-11

1.8 HORIZONTAL BLACK/WHITE LINES 6-12

1.9 JITTER 6-13

1.10 BLACK SPOTS ON THE COPY IMAGE 6-14

1.11 SKEWED (OPTICAL) COPY IMAGE 6-15

1.12 TONER DENSITY TOO HIGH 6-16

1.13 TONER DENSITY TOO LOW. 6-18

1.14 TONER SCATTERING. 6-20

1.15 UNFUSED COPY IMAGE 6-21

1.16 PAPER MISFEED 6-22

1.17 DF ORIGINAL MISFEED OR SKEW 6-23

2. U-CODE CONDITIONS 6-24

2.1 U1 - RIGHT COVER OPEN 6-24

2.2 U2 - KEY COUNTER NOT SET 6-24

2.3 U4 - SORTER OPEN 6-24

2.4 U6 - DRUM PROTECTION SHEET REMAINING 6-24

3. SERVICE CALL CONDITIONS 6-25

3.1 CODE #11 – EXPOSURE LAMP ERROR 6-25

3.2 CODE #12 – EXPOSURE LAMP ERROR 6-25

3.3 CODE #13 – ZERO CROSS SIGNAL ERROR 6-26

3.4 CODE #21 – SCANNER HOME POSITION ERROR 6-26

3.5 CODE #22 – SCANNER HOME POSITION ERROR 6-26

3.6 CODE #28 – LENS HOME POSITION ERROR 6-27

3.7 CODE #29 – LENS HOME POSITION ERROR 6-27

3.8 CODE #2A – 4TH/5TH MIRROR HOME POSITION ERROR 6-27

3.9 CODE #2B – 4TH/5TH MIRROR HOME POSITION ERROR 6-28

3.10 CODE #52 – FUSING LAMP WARM-UP ERROR 6-28

3.11 CODE #53 – FUSING LAMP OVERHEAT 6-28

3.12 CODE #55 – FUSING THERMISTOR OPEN 6-29

3.13 E70 (IN THE MAGNIFICATION INDICATOR) – TONER OVERFLOW 6-29

4. ELECTRICAL COMPONENT DEFECTS 6-30

4.1 SENSORS 6-30

4.2 SWITCHES AND OTHER ELECTRICAL COMPONENTS 6-31

4.3 BLOWN FUSE CONDITION 6-32

DOCUMENT FEEDER

1. SPECIFICATIONS 1

2. COMPONENT LAYOUT 2

3. ELECTRICAL COMPONENT DESCRIPTIONS 3

4. OVERALL MACHINE CONTROL. 4

5. BASIC OPERATION. 6

6. ORIGINAL FEED 8

6.1 ORIGINAL PICK-UP 8

6.2 ORIGINAL SEPARATION. 9

6.3 ORIGINAL FEED-IN MECHANISM 10

6.4 ORIGINAL SIZE DETECTION 12

6.5 ORIGINAL INVERSION MECHANISM. 13

6.6 ORIGINAL FEED-OUT MECHANISM 15

6.7 BELT DRIVE MOTOR CIRCUIT. 16

6.8 FEED-OUT MOTOR CIRCUIT 17

6.9 INPUT AND OUTPUT CIRCUITS. 18

7. LIFT MECHANISM 19

8. ORIGINAL MISFEED DETECTION 20

9. INSTALLATION PROCEDURE 22

9.1 ACCESSORY CHECK 22

9.2 INSTALLATION PROCEDURE 25

10. PREPARATION FOR TRANSPORTATION. 31

11. REPLACEMENT AND ADJUSTMENT 32

11.1 FEED-IN UNIT 32

11.1.1 Transport Belt Replacement 32

11.1.2 Feed-in Unit Removal 34

11.1.3 Pick-up Roller Replacement 35

11.1.4 Feed-in Clutch Lubrication 36

11.1.5 Pick-up Solenoid Adjustment 37

11.1.6 Feed Roller Replacement 39

11.1.7 Feed-in Solenoid Adjustment 40

11.1.8 Friction Belt Replacement. 41

11.2 FEED-OUT UNIT 42

11.2.1 Feed-out Unit Removal 42
11.2.2 Inverter Solenoid Adjustment 43
11.2.3 DF Leading Edge Registration Adjustment 44
11.3 BELT DRIVE MOTOR SPEED ADJUSTMENT 45

SORTER

1. SPECIFICATIONS 1
2. COMPONENT LAYOUT 2
3. ELECTRICAL COMPONENT DESCRIPTIONS 3
4. OVERALL MACHINE CONTROL. 4
5. BASIC OPERATION 5
6. EXIT ROLLER DRIVE. 6
6.1 ROLLER DRIVE MECHANISM. 6
6.2 ROLLER DRIVE CIRCUIT 7
7. BIN DRIVE 8
7.1 BIN DRIVE MECHANISM. 8
7.2 BIN DRIVE CIRCUIT 10
8. MISFEED DETECTION. 11
9. INSTALLATION PROCEDURE 12
9.1 ACCESSORY CHECK 12
9.2 INSTALLATION PROCEDURE 13
10. PREPARATION FOR TRANSPORTATION 16
11. ROLLER DRIVE BELT REPLACEMENT. 17
12. BIN GUIDE LUBRICATION 18

SECTION 1

OVERALL MACHINE INFORMATION

1. SPECIFICATIONS

Configuration:	Desk top
Copy Process:	Dry electrostatic transfer system
Originals:	Sheet/Book
Original Size:	Maximum: A3/11" x 17"
Copy Paper Size:	Maximum: A3/11" x 17" Minimum: A6/5½" x 8½" (lengthwise) ..... Manual and cassette feeds A5/11" x 8½" (sideways) ..... Paper tray feed
(Duplex Copying)	A4/11" x 8½" (sideways)
Copy Paper Weight:	Cassette feed: 58 to 128 g/m^2 (16 to 34 lb) Paper tray feed: 64 to 81 g/m^2 (17 to 22 lb) Manual feed: 52 to 157 g/m^2 (14 to 42 lb)
Reproduction Ratios:	5 Enlargement and 7 Reduction

Enlargement	115% 122% 129% 141% 155%
Full size	100%
Reduction	65% 71% 74% 77% 82% 87% 93%

Zoom:	From 61% to 156% in 1% steps
Copying Speed:	22 copies/minute (A4/11" x 8½" sideways) 11 copies/minute (A3/11" x 17")
Warm-Up Time:	Less than 60 seconds (at 20°C)
First Copy Time:	5.9 seconds (A4/11" x 8½" sideways for cassette feed)
Copy Number Input:	Ten-key pad, 1 to 99 (count up)

Manual Image Density Selection:	7 steps
Automatic Reset:	All input modes are reset 1 minute after the copier is not in use; can also be set to 3 minutes or no auto reset.
Energy Saver Function:	Reducing electricity consumption (Manual or manual/auto)
Toner Saver Function:	Reducing toner consumption
Paper Capacity:	Cassettes: 250 sheets Paper tray: 250 sheets Manual feed table: 1 sheet
Toner Replenishment:	Black: Cartridge exchange (380 g/cartridge)
Copy Tray Capacity:	250 sheets (B4/8 1/2" x 14" and smaller) 100 sheets (A3/11" x 17")
Power Source:	110 V/ 60 Hz/ 15 A (for Taiwan) 220-240 V/ 50 Hz/ 6 A (for Europe/Asia) 220 V/ 60 Hz/ 6 A (for Middle East) (Refer to the serial number plate (rating plate) to determine the power source required by the machine.)

Power Consumption:

	Copier only	Full system*
Maximum	1.2 kVA	1.5 kVA
Warm-up	730 VA (average)	740 VA
Copy cycle	830 VA (average)	840 VA
Stand-by (without energy saver function)	200 VA (average)	210 VA

* Full system = Copier with document feeder and 10-bin sorter.

Dimensions:

	Width	Depth	Height
Copier only (without platen cover)	672 mm, 26.5"	608 mm, 24.0"	410 mm, 16.2"
With the cassette, platen cover, and the copy tray extended	1130 mm, 44.5"	608 mm, 24.0"	464 mm, 18.3"
Full system (with the cassette, document feeder, and 10-bin sorter)	1149 mm, 45.3"	608 mm, 24.0"	513 mm, 20.2"

Noise Emissions:

Sound pressure level (the measurements are made according to ISO 7779 at the operator position).

	Copier only	**Full system***
Copying	Less than 62 dB (A)	Less than 66 dB (A)

*Full system: Copier with document feeder and 10-bin sorter

Sound power level (The measurements are made according to ISO 7779.)

	Copier only	**Full system***
Stand-by	Less than 40 dB (A)	Less than 40 dB (A)
Copying	Less than 68 dB (A)	Less than 72 dB (A)

*Full system: Copier with document feeder and 10-bin sorter

Weight:

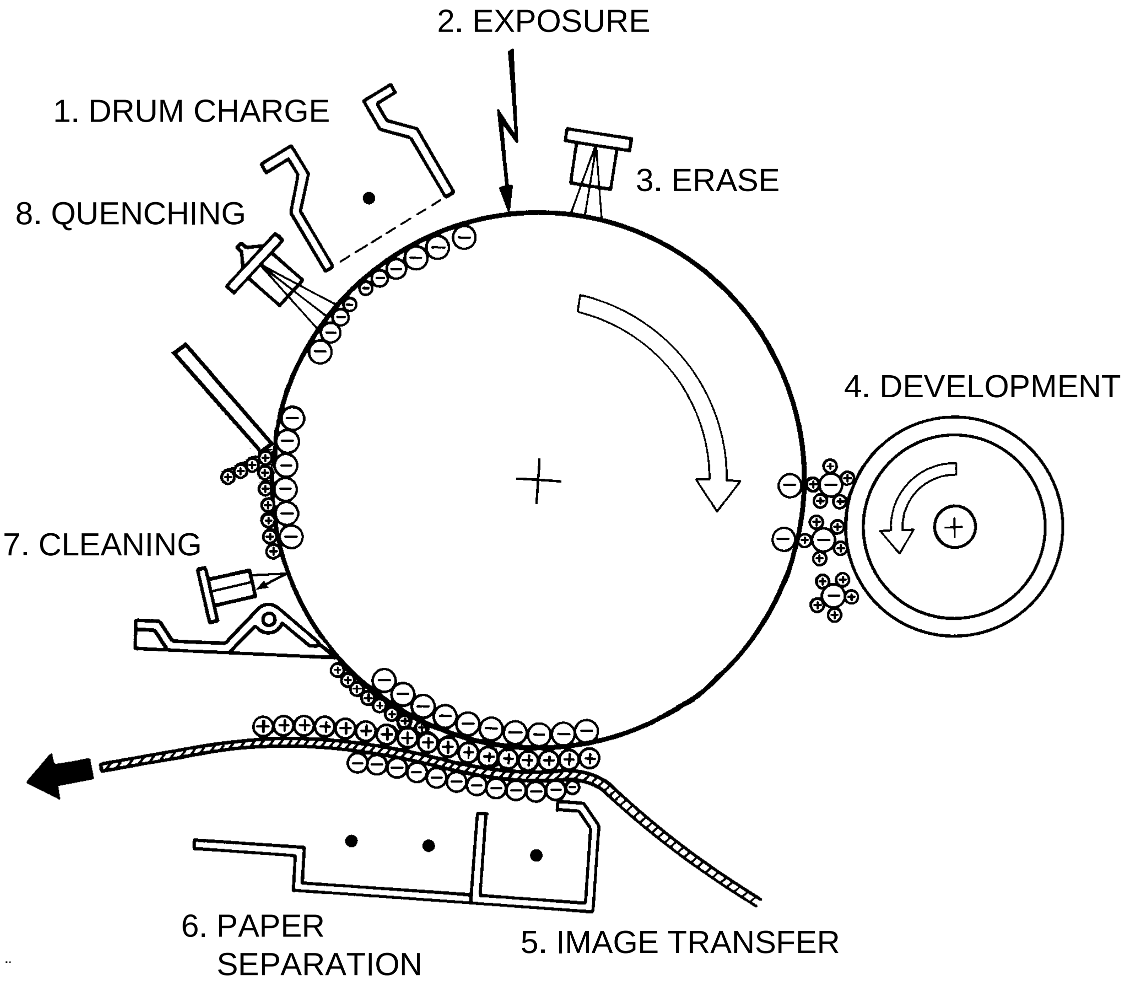
Copier only	47 kg (103.7 lb)
Full system	70 kg (154.4 lb)

Optional Equipment and Machine Configuration:

- Document feeder (A318)
- 10-bin sorter (A490)
- Key counter
- Optics anti-condensation heater
- Toner overflow sensor
- Pre-transfer lamp

Specifications are subject to change without notice.

2. COPY PROCESSES AROUND THE DRUM


2. EXPOSURE
1. DRUM CHARGE
3. ERASE
8. QUENCHING
4. DEVELOPMENT
7. CLEANING
6. PAPER SEPARATION
5. IMAGE TRANSFER

A173V500.img

1. DRUM CHARGE

In the dark, the charge corona unit gives a uniform negative charge to the organic photoconductive (OPC) drum. The charge remains on the surface of the drum because the OPC drum has a high electrical resistance in the dark.

2. EXPOSURE

An image of the original is reflected to the drum surface via the optics assembly. The charge on the drum surface is dissipated in direct proportion to the intensity of the reflected light, thus producing an electrical latent image on the drum surface.

3. ERASE

The erase lamp illuminates the areas of the charged drum surface that will not be used for the latent image. The resistance of the drum in the illuminated areas drops and the charge on those areas dissipates.

4. DEVELOPMENT

Positively charged toner is attracted to the negatively charged areas of the drum, thus developing the latent image. (The positive triboelectric charge is caused by friction between the carrier and toner particles.)

5. IMAGE TRANSFER

Paper is fed to the drum surface at the proper time so as to align the copy paper and the developed image on the drum surface. Then, a strong negative charge is applied to the back side of the copy paper, producing an electrical force which pulls the toner particles from the drum surface to the copy paper. At the same time, the copy paper is electrically attracted to the drum surface.

6. PAPER SEPARATION

A strong ac corona discharge is applied to the back side of the copy paper, reducing the negative charge on the copy paper and breaking the electrical attraction between the paper and the drum. Then, the stiffness of the copy paper causes it to separate from the drum surface. The pick-off pawls help to separate paper.

7. CLEANING

The cleaning blade scrapes the loosened toner off the drum.

8. QUENCHING

Light from the quenching lamp electrically neutralizes the surface of the drum.

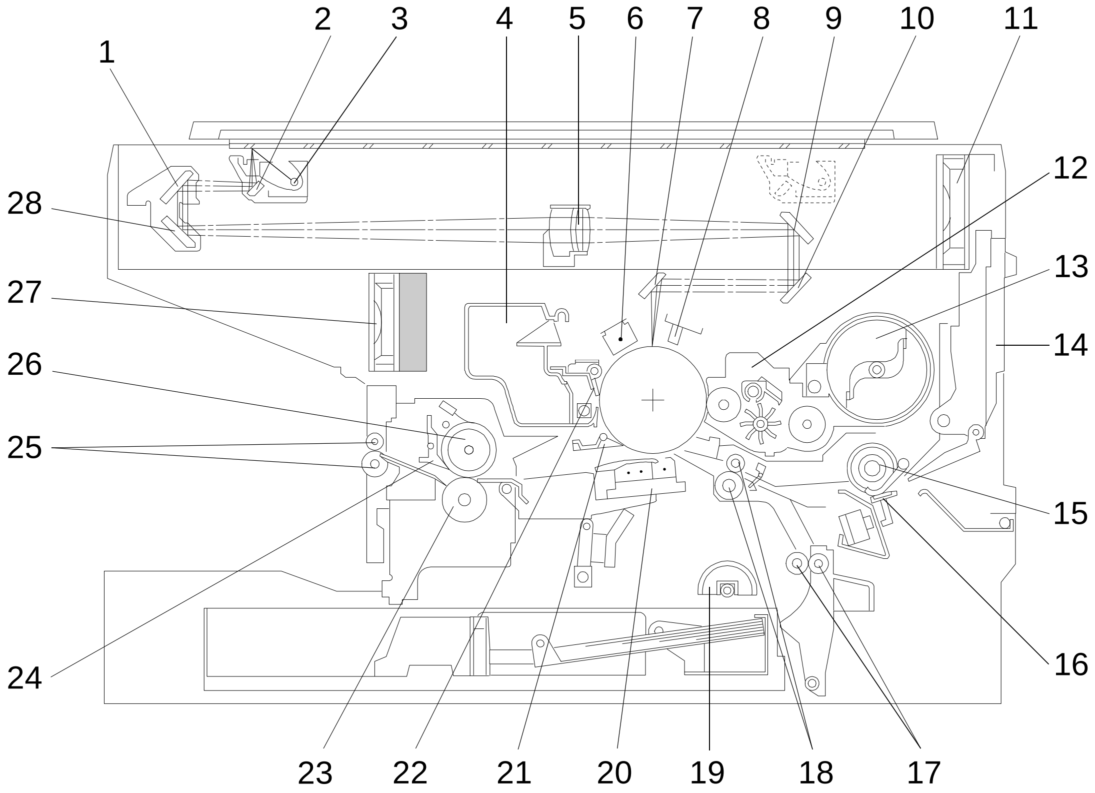
3. COPY PROCESS CONTROL

	Grid Voltage	Exposure Lamp Voltage	Development Bias Voltage	Erase Lamp
Image Density Control	Standard image density grid voltage (–760V) + Drum residual voltage (Vr) correction factor (SP67)	Base exposure lamp voltage [SP48] + VL correction factor [SP61] + Image Density Factor (Manual ID mode only) + Reproduction ratio correction factor	Base bias voltage 1. Manual mode 2. ADS mode [SP34] + Base bias voltage adjustment factor + Drum residual voltage (Vr) correction factor (SP67)	Depending on paper size and reproduction ratio
Toner Density Detection	Standard ID Sensor grid voltage (–560V) + Vp correction factor (SP69)	Same as image density control	Toner density adjustment factor + Vd correction factor (SP64) + ID sensor bias setting (SP33)	ID sensor pattern erase (Vsg detection: Full erase)
Residual Voltage (Vr) Detection	–500 volts (Fixed)	Same as image density control	0 volt (Fixed)	Full erase (All LEDs ON)
Between Copies (Non-image area)	0 volt (Fixed)	Exposure lamp turns off	–160 volts (Fixed) + Base bias voltage adjustment factor + Drum residual voltage (Vr) correction factor (SP67)	Full erase (All LEDs ON)

NOTE: a) Boxed items can be adjusted by SP modes surrounded by square brackets [ ].

b) The setting which determines the correction factor can be observed by SP modes surrounded by parenthesis ( ).

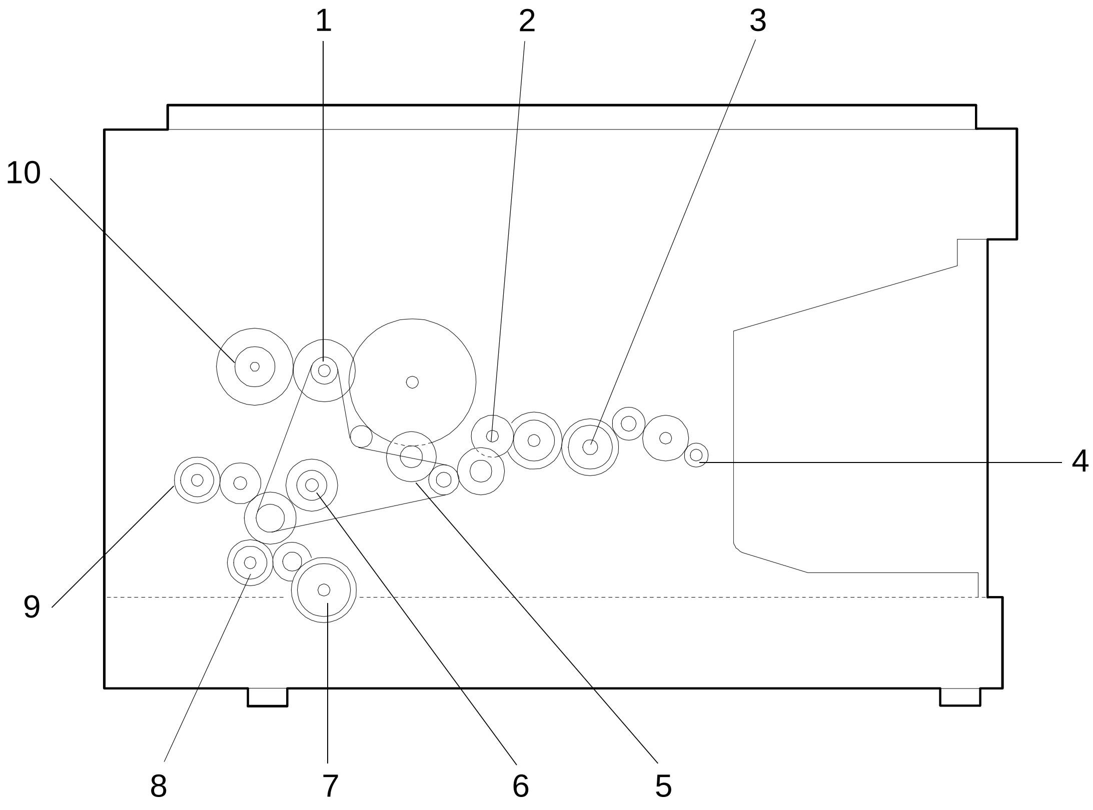
4. MECHANICAL COMPONENT LAYOUT



A173V501.wmf

1. 2nd Mirror
2. 1st Mirror
3. Exposure Lamp
4. Cleaning Unit
5. Lens
6. Charge Corona Unit
7. 6th Mirror
8. Erase Lamp
9. 4th Mirror
10. 5th Mirror
11. Optics Cooling Fan
12. Development Unit
13. Toner Supply Unit
14. Manual Feed Table
15. Paper Feed Roller
16. Friction Pad
17. Relay Rollers
18. Registration Rollers
19. 2nd Feed Rollers
20. T &S Corona Unit
21. Pick-off Pawl
22. Cleaning Blade
23. Pressure Roller
24. Hot Roller Strippers
25. Exit Rollers
26. Hot Roller
27. Exhaust Fan
28. 3rd Mirror

5. DRIVE LAYOUT



A173V502.wmf

1. Development Drive Gear
2. Cleaning Drive Gear
3. Hot Roller Drive Gear
4. Exit Roller Drive Gear
5. Drum Drive Gear
6. Registration Roller Clutch Gear
7. 2nd Feed Clutch Gear
8. Relay Roller Clutch Gear
9. 1st Feed Clutch Gear
10. Toner Supply Clutch Gear

6. ELECTRICAL COMPONENT DESCRIPTIONS

Symbol	Name	Function	Index No.
Motors			
M1	Main Motor	Drives all the main unit components except for the optics unit and fans (115/220/230/240 Vac).	5
M2	Scanner Motor	Drives the scanners (1st and 2nd) (dc stepper).	4
M3	Lens Motor	Moves the lens position in accordance with the selected magnification (dc stepper).	2
M4	4th/5th Mirror Motor	Moves the 4th/5th mirror position in accordance with the selected magnification (dc stepper).	8
M5	Optics Cooling Fan Motor	Prevents build-up of hot air in the optics cavity (24 Vdc).	41
M6 M7	Exhaust Fan Motors	Removes heat from around the fusing unit and blows the ozone built up around the charge corona unit to the ozone filter (24 Vdc).	34
Clutches			
CL1	Registration Clutch	Transfers drive to the registration rollers.	9
CL2	1st Paper Feed Clutch	Transfers drive to the 1st paper feed roller.	11
CL3	2nd Paper Feed Clutch	Starts paper feed from the 2nd paper feed station.	16
CL4	Relay Roller Clutch	Drives the relay rollers for the 2nd paper feed station.	13
CL5	Toner Supply Clutch	Transfers drive to the toner supply roller.	7
Switches			
SW1	1st Paper Size Switch	Determines what size paper is in the cassette.	15
SW2	Right Cover Switch	Detects when the right cover is open.	14
SW3	2nd Tray Set Switch	Detects when the 2nd tray is slid out.	19
SW4	Manual Feed Table Switch	Detects when the manual feed table is open.	10
SW5	Cover Open Switch	Cuts the ac power line when the front cover is open.	32
SW6	Main Switch	Supplies power to the copier.	33
Sensors			
S1	Scanner Home Position Sensor	Informs the CPU when the 1st scanner is at the home position.	1

Symbol	Name	Function	Index No.
S2	Lens Home Position Sensor	Informs the CPU when the lens is at the home position (full size position).	3
S3	4th/5th Mirror Home Position Sensor	Informs the CPU when the 4th/5th mirrors assembly is at the home position (full size position).	6
S4	ADS Sensor	Sensor the background density of the original.	25
S5	Registration Sensor	Detects misfeeds.	18
S6	2nd Paper End Sensor	Informs the CPU when the upper paper tray runs out of paper.	17
S7	Image Density (ID) Sensor	Detects the density of the image on the drum to control the toner density.	21
S8	1st Paper End Sensor	Informs the CPU when the cassette runs out of paper.	12
S9	Exit Sensor	Detects misfeeds. Detects when the exit cover is open.	26
Printed Circuit Boards			
PCB1	Main Board	Controls all copier functions.	40
PCB2	Power Supply/ AC Drive Board	Drives all ac motors, the exposure lamp, fusing lamp, quenching lamp, and exhaust fan motor.	36
PCB3	Operation Panel Board	Informs the CPU of the selected modes and displays the situation on the panel.	29
Lamps			
L1	Erase Lamp	Discharges the drum outside of the image area. Provides leading/trailing edge, side, and editing erases.	22
L2	Quenching Lamp	Neutralizes any charge remaining on the drum surface after cleaning.	23
L3	Fusing Lamp	Provides heat to the hot roller.	24
L4	Exposure Lamp	Applies high intensity light to the original for exposure.	31
Power Packs			
P1	CC/Grid/Bias Power Pack	Provides high voltage for the charge corona, grid, and the development roller bias.	38
P2	TC/SC Power Pack	Provides high voltage for the transfer and separation corona.	39
Heaters			
H1	Anti-condensation Heater	Prevents moisture around the drum.	35

Symbol	Name	Function	Index No.
Counters			
CO1	Total Counter	Keeps track of the total number of copies made.	20
Others			
C1	Main Motor Capacitor	Protects the power supply/ac drive PCB from induced current.	37
TF1	Fusing Thermofuse	Provides back-up overheat protection in the fusing unit.	28
TF2	Optics Thermofuse	Provides back-up overheat protection around the exposure lamp.	30
TH1	Fusing Thermistor	Monitors the fusing temperature.	27

7. MAJOR DIFFERENCES BETWEEN THE A110 AND A173 MODELS

The A173 model was developed based on the A110 model.

The following table lists the major differences between the A173 model and the A110 model.

No.	Item	A173 model (Condor)	A110 model (Pigeon)
Overall			
1	Duplex Unit	Not available	Option
2	Color Toner	Color toner cannot be used with this machine.	Color toner can be used with the optional color development unit.
3	Zoom Range	61% to 156% (NOTE 1)	50% to 200%
4	Toner Saver Mode	Available (Refer to 5.4 of section 2.)	Not available
5	Drum Anti-condensation Heater	Standard	Option
6	SP Mode Access Procedure (Refer to 2.1 of section 4.)		
7	PCBs	There is one board which applies both ac and dc power.	There are separate ac drive and dc power supply boards.
8	Operation Panel	There is only one type of operation panel which covers both inch and mm versions.	There are separate inch and mm versions.
9	Transformer Connector	No connector change is needed.	The transformer connector position must be changed when the machine is installed in 230V or 240V areas.
Around the Drum			
10	Pre-transfer Lamp (PTL)	The PTL is not installed. (NOTE 2)	The PTL is installed.
11	Erase Lamp	10 blocks (Refer to 4.1.1 of section 2.)	16 blocks
Process Control			
12	V_L Correction	The lamp voltage is compensated using the ADS sensor. (Refer to 3.7.3 of section 2.)	The lamp voltage increases at the specified period.
13	Vp Correction	Vp correction is not done. (NOTE 3)	Vp correction is done.
14	Drum Wear Correction	Drum wear correction is not done. (NOTE 3)	Drum wear correction is done.

No.	Item	A173 model (Condor)	A110 model (Pigeon)
15	VSG Adjustment	VSG can automatically be adjusted using SP54.	There is a variable resistor on the main board to adjust VSG.
16	ADS Adjustment	ADS standard voltage can automatically be adjusted using SP56.	There is a variable resistor on the main board to adjust ADS standard voltage.
Development			
17	Development Clutch	There is no development clutch. The development roller, agitator, and paddle roller always rotate while the main motor rotates.	There is a development clutch which stops development unit drive while the machine is not in the copy cycle.
18	Developer and Toner	Same as the A7 (A069) and N440 (A085). The toner bottle is unique.	Same as the N220 (A048).
19	Toner End Recovery	The toner end condition is reset when the front door is opened and closed. (NOTE 4)	The machine checks toner end recovery after the toner the toner end condition using the ID sensor.
Cleaning			
20	Cleaning System	Counter blade system	Trailing blade with brush
21	Toner Overflow Detection	The machine counts the copy number and informs the operator when the specified numbers of copies has been made. (Refer to 8.3 of section 2.) (NOTE 5)	A photosensor is used to detect the toner overflow condition.
Paper Feed			
22	Separation Mechanism for the 1st Feed Station	Friction pad separation system	FRR system
23	Manual Feed Table Capacity	1 sheet	50 sheets
24	Tray Paper Size Identification	Customers should input the paper size at the operation panel.	Paper size switches are used to detect paper size in the 2nd paper feed tray.
Options			
25	ADF Interface Board	DF Interface Type B (A625) is needed to install a DF57 (A318).	The function of the board (A625) is included in the main board.

No.	Item	A173 model (Condor)	A110 model (Pigeon)
26	SP Mode Setting for ADF	If inch version paper is used, the SP1 setting should be changed from "0" to "1" when the DF57 is installed.	The operation panel informs the DF which type of paper is used.
27	Optional DC Power Supply Unit	An optional dc power supply unit is not needed.	An optional dc power supply unit is needed to install a DF.
28	Key Counter	To install the key counter, the following parts are required: Key Counter Bracket Key Counter Harness Two M3x6 Sunken Head Screws (Refer to 2.4 of section 3.)	Those parts are included in the main body.

NOTE: 1. The scanner motor stabilizer and the lens shading plates have been removed. If the zoom range has been enlarged using SP12, low image resolution may occur in the range between 157 and 200%, and uneven image density may occur in the range between 50 and 60%.

2. In normal conditions, this does not affect the copy image. However, if the machine is used in extremely high temperature and high humidity conditions, image density in halftone areas will be lighter, or the trailing edge of the copy might not be printed completely. If this problem occurs, install the optional PTL. (Refer to 2.6 of section 3.)

3. Due to the cleaning system change, Vp correction (grid voltage correction) and drum wear correction (lamp voltage correction) are not necessary for this model, because the drum wear is much less than with the previous cleaning system.

4. To avoid toner recovery misdetection, the machine does not monitor the toner recovery. To prevent the customers from resetting the toner end condition without replacing the toner cartridge, toner end recovery detection (same as the method for the A110 model) can be enabled by changing the SP38 setting.

5. The number of possible copies before "E70" blinks can be changed using SP116. (With the 6% chart, the toner tank can store used toner for more than 60K copies.)
An optional toner overflow sensor (service parts) can be installed to detect the toner overflow condition. (Refer to 2.5 of section 3.)

SECTION 2

DETAILED SECTION DESCRIPTIONS

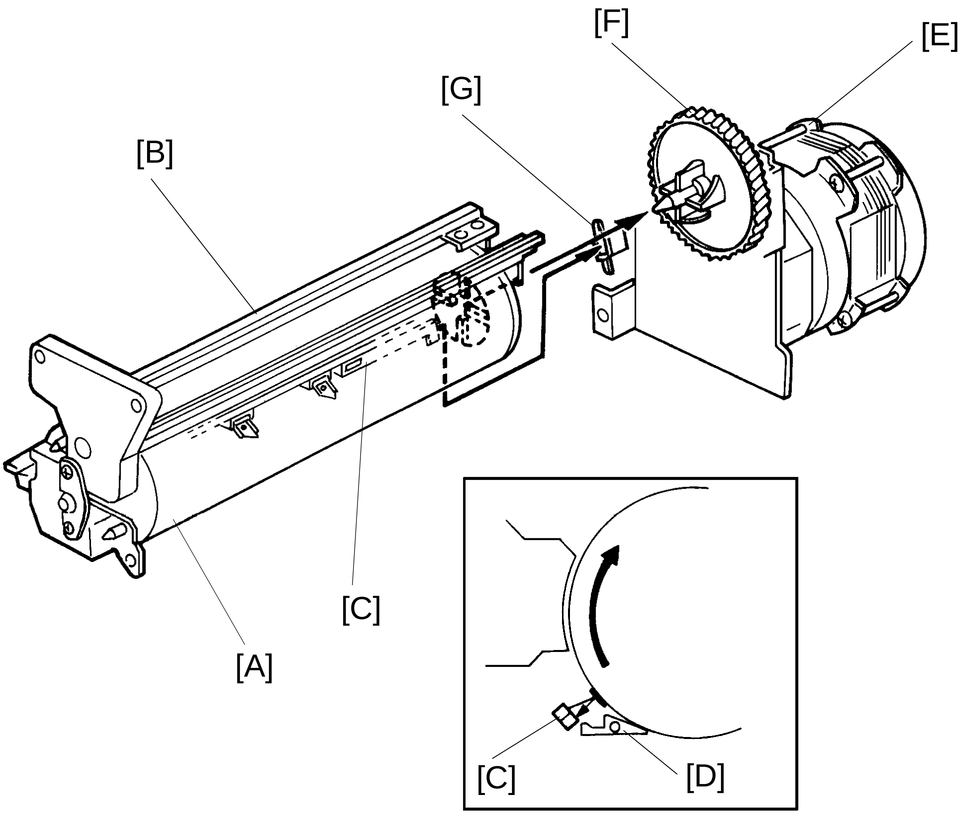
1. DRUM

1.1 OPC DRUM CHARACTERISTICS

An OPC has the characteristics of:

1. Being able to accept a high negative electrical charge in the dark. (The electrical resistance of a photoconductor is high in the absence of light.)
2. Dissipating the electrical charge when exposed to light. (Exposure to light greatly increases the conductivity of a photoconductor.)
3. Dissipating an amount of charge in direct proportion to the intensity of the light. That is, where stronger light is directed to the photoconductor surface, a smaller voltage remains on the OPC.
4. Being less sensitive to changes in temperature (when compared to selenium F type drums).
5. During the drum’s life, drum residual voltage gradually increases and the photoconductive surface becomes worn. Therefore, some compensation for these characteristics is required.

1.2 DRUM UNIT



A173D500.img

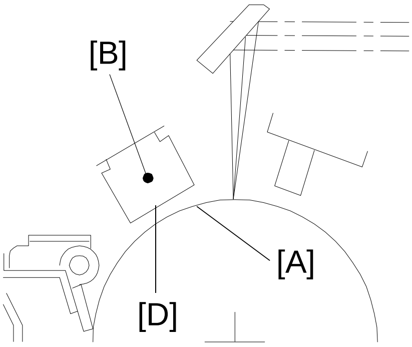
An organic photoconductor drum [A] is used in this model.

A drum unit [B] is used to hold the drum to prevent stress on the drum. The drum unit consists of an OPC drum, ID sensor [C] and pick-off pawls [D]. When the drum is replaced, and/or the pick-off pawls and/or the ID sensor are cleaned, the drum unit must be removed from the copier as a unit.

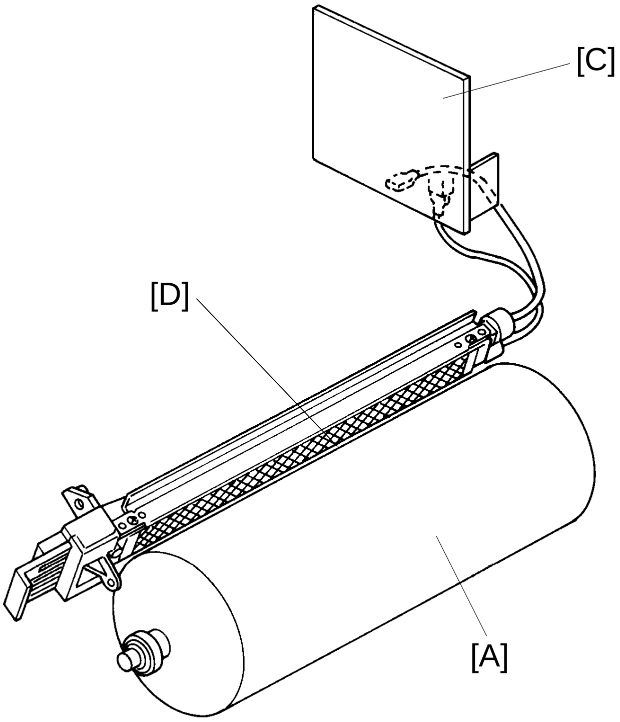
The drum is driven by the main motor [E] through the main motor gear, a relay gear and the drum drive gear [F]. The pick-off pawls are always in contact with the drum surface. The ID sensor is electrically connected to the ID sensor connector [G].

2. DRUM CHARGE

2.1 OVERVIEW



A173D501.wmf



A173D502.img

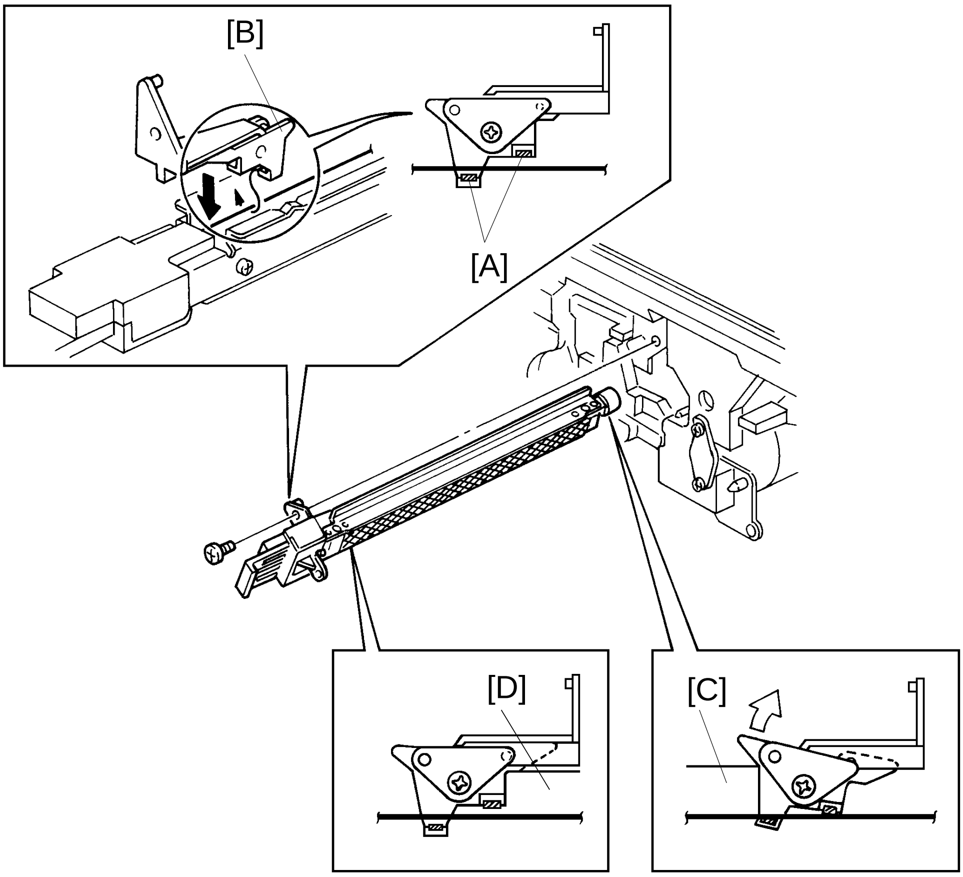
This copier uses a single wire scorotron and a highly sensitive OPC drum [A]. The corona wire [B] generates a corona of negative ions when the CC/Grid/Bias power pack [C] applies a high voltage. The CC/Grid/Bias power pack also applies a negative high voltage to a stainless steel grid plate [D]. This insures that the drum coating receives a uniform negative charge as it rotates past the corona unit.

The exhaust blower, located above the copy exit, causes a flow of air from the upper area of the development unit through the charge corona unit. This prevents uneven build-up of negative ions that can cause uneven image density. The exhaust blower runs at half speed when in the stand-by condition and runs at full speed while copying.

The exhaust blower has an ozone filter (active carbon) which absorbs ozone (O_3) generated by the corona charge. The ozone filter decreases in efficiency over time as it adsorbs ozone. The ozone filter should be replaced every 60,000 copies.

The flow of air around the charge corona wire may deposit paper dust or toner particles on the corona wire. These particles may interfere with charging and cause low density bands on copies. The wire cleaner cleans the corona wire when the operator slides the corona unit in and out.

2.2 CHARGE CORONA WIRE CLEANER MECHANISM



A173D503.img

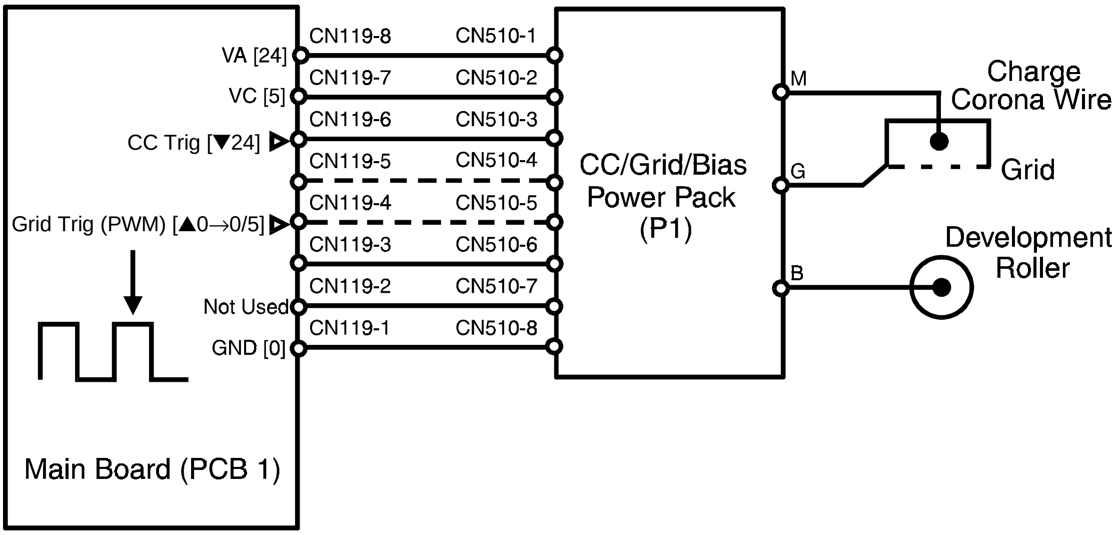
Pads [A] above and below the charge corona wire clean the wire as the charge unit is manually slid in after it has been pulled out.

The cleaner pad bracket [B] rotates when the charge unit is fully extended and the bracket is pulled up against the rear block [C]. This moves the pads against the corona wire (see illustration). If the charge unit is not fully extended, the pads do not touch the corona wire.

The pads move away from the wire when the charge unit is fully inserted and the cleaning bracket is pushed against the front block [D].

After copier installation, the key operator should be instructed how to use this mechanism when copies have white streaks.

2.3 CHARGE CORONA CIRCUIT


VA [24]
VC [5]
CC Trig [▼24]
Grid Trig (PWM) [▲0→0/5]
Not Used
GND [0]
Main Board (PCB 1)
CN119-8
CN119-7
CN119-6
CN119-5
CN119-4
CN119-3
CN119-2
CN119-1
CN510-1
CN510-2
CN510-3
CN510-4
CN510-5
CN510-6
CN510-7
CN510-8
CC/Grid/Bias Power Pack (P1)
M
G
B
Charge Corona Wire
Grid
Development Roller

A173D504.wmf

The main board supplies +24 volts to the CC/Grid/Bias power pack at CN510-1 as the power supply source. After the Start key is pressed, the CPU drops CN119-6 from +24 volts to 0 volts. This energizes the charge corona circuit within the CC/Grid/Bias power pack, which applies a high negative voltage of approximately –5.6 kV to the charge corona wire. The corona wire then generates a negative corona charge.

The grid limits the charge voltage to ensure that the charge does not fluctuate and an even charge is applied to the drum surface.

The grid trigger pulse applied to CN510-5 is a pulse width modulated signal (PWM signal). This signal is not only a trigger signal; it also changes the voltage level of the grid. As the width of the pulse applied increases, the voltage of the grid also increases.

2.4 GRID VOLTAGE CORRECTION (VR CORRECTION)

During the drum’s life, the drum may fatigue electrically and residual voltage (Vr) on the drum may gradually increase. When this happens, the corona charged voltage on the drum is not discharged enough in the quenching and exposure processes. As a result, after the development bias is applied in the development process, the background area of the original on the drum may attract some toner. This may cause dirty background on copies. The Vr correction prevents this problem as follows.

A pattern (Vr pattern) is developed on the drum every 1000 copies and its reflectivity is detected by the ID sensor to measure the residual voltage. This is called residual voltage detection. If the reflectivity is low, the residual voltage will be high. When the Vr pattern is developed, all blocks of the erase lamp turn on, the grid voltage is –500 volts, and the development bias voltage is 0 volt.

The CPU determines what level of Vr correction is necessary depending on the output (Vr ratio [L]) from the ID sensor.

$$L = \frac{Vrp}{Vsg} \times 100(\%)$$

Vrp: ID sensor output for the Vr pattern
Vsg: ID sensor output for the bare drum

The CPU increases the development bias voltage depending on the Vr ratio to prevent dirty background on copies. (See section 5-3: "Development Bias for Image Density Control" for more information.) The CPU also increases the grid voltage to ensure proper image density depending on the Vr ratio. (See section 2-5, "Grid Voltage Control".)

The current Vr ratio is displayed with SP67.

2.5 GRID VOLTAGE CONTROL

The main board controls the grid voltage for copying and for toner density detection through the CC/Grid/Bias power pack. As the grid voltage for the image density control becomes less, the copy image becomes lighter and vice versa.

As the grid voltage for the toner density detection becomes less, the toner concentration in the developer becomes higher and vice versa.

The grid voltage is based on the standard grid voltage and the correction factor as follows.

2.5.1 Image Density Control

Grid Voltage = Standard image density grid voltage (–760 volts [SP60 = 9])
+
Vr correction factor

Vr Correction Factor

L	Change of grid voltage
100 to 89 (%)	±0 (volt)
88 to 76 (%)	–40 (volts)
75 to 62 (%)	–80 (volts)
61 to 45 (%)	–120 (volts)
44 to 0 (%)	–160 (volts)

L = Vrp/Vsg x 100 (Vr correction ratio)
Vrp: ID sensor output for the Vr correction pattern
Vsg: ID sensor output for the bare drum

NOTE: The grid voltage for areas between copies (non-image area) is 0 volt (fixed).

2.5.2 Vr Detection

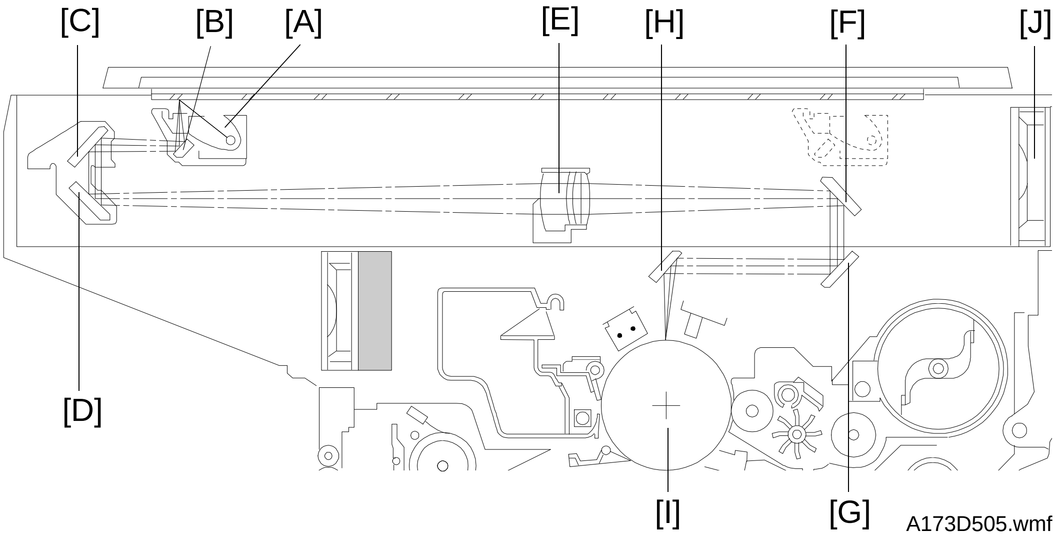
Grid Voltage = –500 volts (fixed)

2.5.3 Toner Density Detection

Grid Voltage = –560 volts + Vp correction factor
+
ID sensor bias setting (SP33)

3. OPTICS

3.1 OVERVIEW



During the copy cycle, an image of the original is reflected onto the drum surface through the optics assembly as follows.

Light Path:

Exposure Lamp [A] → Original → First Mirror [B] → Second Mirror [C]
→ Third Mirror [D] → Lens [E] → Fourth Mirror [F]
→ Fifth Mirror [G] → Sixth Mirror [H] → Drum [I]

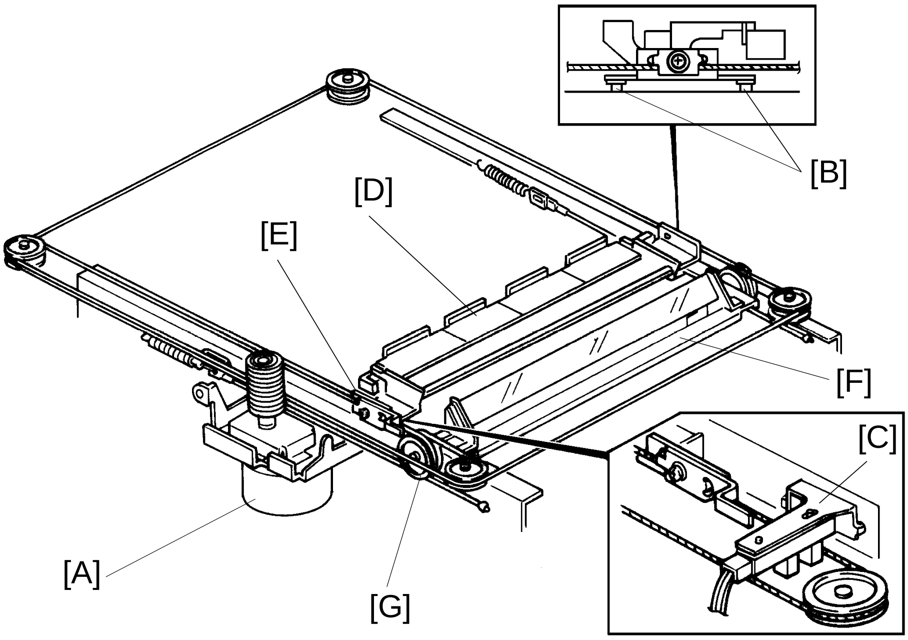
The optics cooling fan [J] draws cool air into the optics cavity. The air flows from the right to the left in the optics cavity and exhausts through the vents in the left cover. These fans operate during the copy cycle.

This copier has thirteen standard reproduction ratios: Seven reduction ratios, five enlargement ratios, and full size. It also has a zoom function. The operator can change the reproduction ratio in one percent steps from 61% to 156%.

Stepper motors are used to change the positions of the lens and mirrors. Separate motors are used because the wide range of reproduction ratios makes it mechanically difficult for one motor to position both the lens and mirrors. A stepper motor is also used to drive the scanner. This motor changes the scanner speed depending on the reproduction ratio.

The thermofuse opens at 104°C and removes ac power to the exposure lamp to prevent overheating.

3.2 SCANNER DRIVE



A173D506.img

This model uses a stepper motor [A] to drive the scanners. Both ends of each scanner are driven to prevent skewing. The scanners have sliders [B], which ride on guide rails.

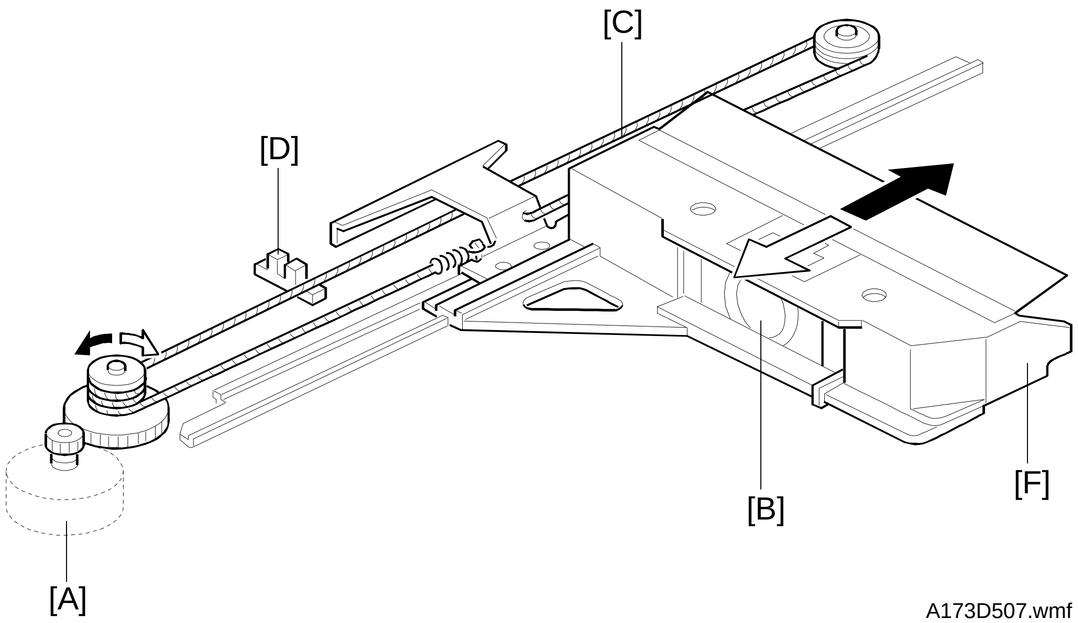
The scanner home position is detected by the home position sensor [C]. The scanner return position is determined by counting the scanner motor drive pulses.

The first scanner [D], which consists of the exposure lamp and the first mirror, is connected to the scanner drive wire by the wire clamps [E]. The second scanner [F], which consists of the second and third mirrors, is connected to the scanner drive wire by movable pulleys (the second scanner pulley [G]).

The pulley moves the second scanner at half the velocity of the first scanner. This is to maintain the focal distance between the original and the lens during scanning. This relationship can be expressed as:

V1r = 2 (V2r) = VD/r
where r = Reproduction ratio
V1r = First scanner velocity (when the reproduction ratio is "r")
V2r = Second scanner velocity (when the reproduction ratio is "r")
VD = Drum peripheral velocity (120 mm/s)

3.3 LENS DRIVE



A173D507.wmf

➡ : Reduction

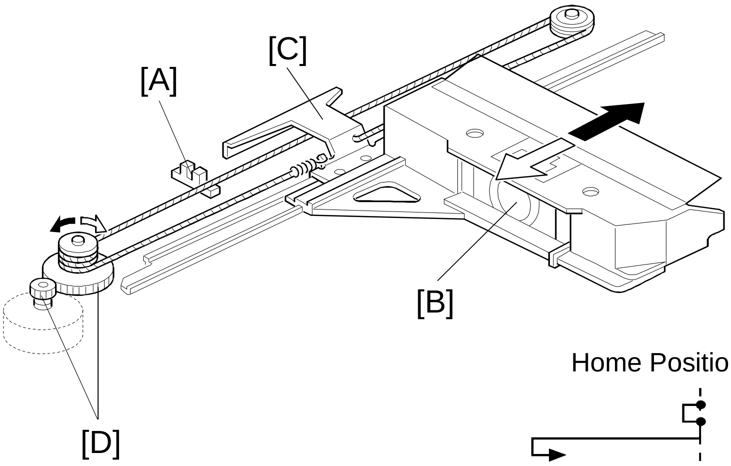
⇦ : Enlargement

3.3.1 Lens Drive

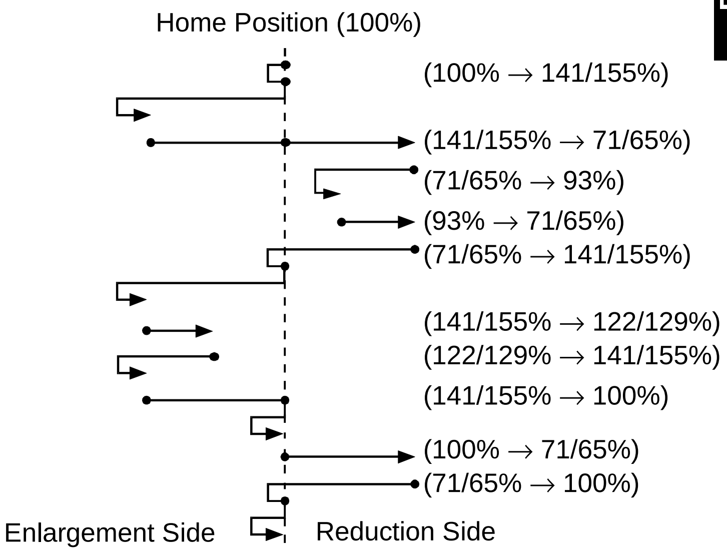
The lens motor [A] (a stepper motor) changes the lens [B] position through the lens drive wire [C] depending on the selected reproduction ratio to provide the proper optical distance between the lens and the drum surface.

The rotation of the lens drive pulley moves the lens back and forth in discrete steps. The home position of the lens is detected by the home position sensor [D]. The main board keeps track of the lens position based on the number of pulses sent to the lens motor.

3.3.2 Lens Positioning



A173D507.wmf


Home Position (100%)
(100% → 141/155%)
(141/155% → 71/65%)
(71/65% → 93%)
(93% → 71/65%)
(71/65% → 141/155%)
(141/155% → 122/129%)
(122/129% → 141/155%)
(141/155% → 100%)
(100% → 71/65%)
(71/65% → 100%)
Enlargement Side
Reduction Side

A173D508.wmf

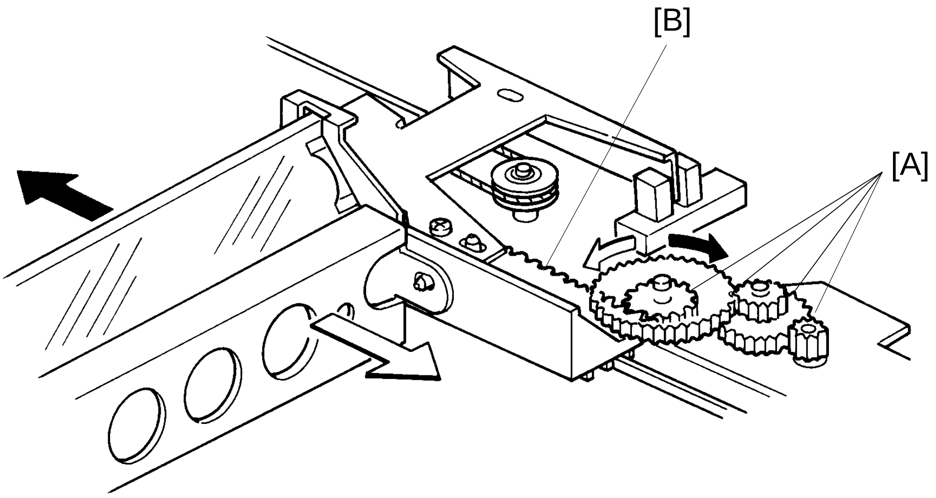
The lens home position sensor [A] informs the main board when the lens is at full size position (home position). The main board determines the lens stop position in reduction and enlargement modes by counting the number of pulses the motor makes with reference to the lens home position. When a new reproduction ratio is selected, the lens [B] moves directly to the required position.

The lens home position is registered each time the lens starts from or passes through the lens home position sensor. As the lens moves from the enlargement side to the reduction side, the sensor registers the home position. This occurs when the actuator plate [C] enters the lens home position sensor.

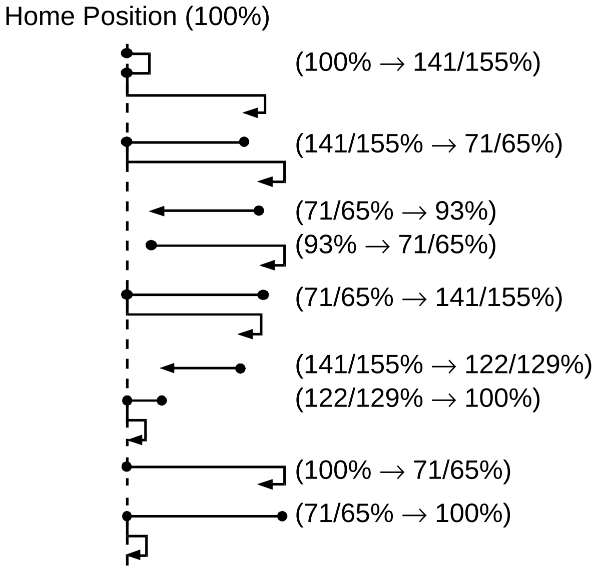
To ensure correct lens positioning, the home position is registered only when the actuator passes the sensor from left to right (enlargement side to reduction side). When the lens moves from the reduction side to the enlargement side, the actuator overshoots the home position once, then moves back to register the home position.

The lens always stops while moving from left to right (as viewed from the front) to minimize the error caused by mechanical play in the drive gears [D].

3.4 4TH AND 5TH MIRROR DRIVE



A173D509.img


Home Position (100%)
(100% → 141/155%)
(141/155% → 71/65%)
(71/65% → 93%)
(93% → 71/65%)
(71/65% → 141/155%)
(141/155% → 122/129%)
(122/129% → 100%)
(100% → 71/65%)
(71/65% → 100%)

A173D510.wmf

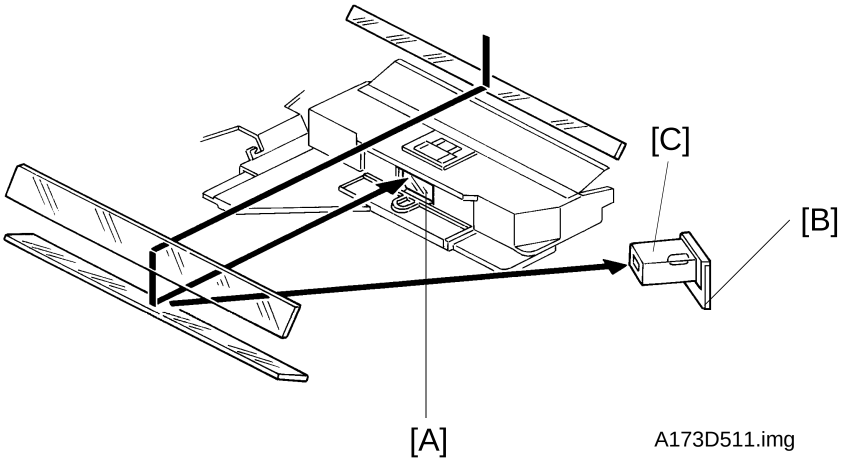
3.4.1 Drive

The 4th/5th mirror drive motor (a stepper motor) changes the 4th/5th mirror assembly position through the pinion gears [A] and the rack gear [B] depending on the selected reproduction ratio to provide the proper optical distance between the lens and drum surface.

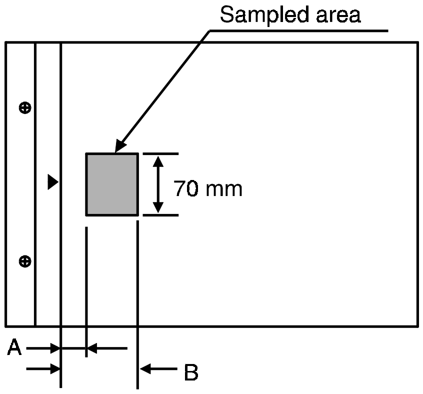
3.4.2 Positioning

The positioning mechanism is similar to that of lens positioning, as shown in the above positioning chart. The scanner always stops while moving from right to left (as viewed from the front).

3.5 AUTOMATIC IMAGE DENSITY DETECTION



A173D511.img



A173D512.wmf

Light from the exposure lamp is reflected from the original and travels to the lens [A] via the mirrors. The auto ID sensor [B], a photodiode, is mounted on the upper front frame. The sensor cover [C] has a hole in it to allow light to fall directly onto the sensor. Sampling starts 10 millimeters (A) from the leading edge of the original and continues to 50 millimeters (B) from the leading edge of original in full size mode. These lengths will vary depending on the selected reproduction ratio.

The lengths "A" and "B" for each reproduction ratio are calculated as follows:

$$A = \frac{10\text{ mm}}{\text{Reproduction Ratio (\%)}} \times 100 \qquad B = \frac{50\text{ mm}}{\text{Reproduction Ratio (\%)}} \times 100$$

The photosensor circuit converts the light intensity to a voltage. The detected voltage is amplified and sent to the main PCB. The CPU stores the voltage of each sampled point in RAM. It then computes the image density of the original from the maximum sample voltage and changes the development bias accordingly. (See "Development Bias for Image Density Control" for details.) The exposure lamp voltage is affected by the image density of the original.

3.6 EXPOSURE LAMP VOLTAGE CORRECTION

To maintain good copy quality, the exposure lamp voltage is changed by the following:

- V_L correction
- Reproduction ratio correction

3.6.1 V_L Correction

The light intensity may decrease because of dust accumulated on the optics parts. This may cause dirty background on copies. To compensate for this sympton, V_L correction is done.

3.6.2 Reproduction Ratio Correction

To compensate for the change in the concentration of light on the drum, the exposure lamp voltage increases depending on the selected reproduction ratio (see section 3-7, "Exposure Lamp Voltage Control").

3.7 EXPOSURE LAMP VOLTAGE CONTROL

The main board controls the exposure lamp voltage through the ac drive board. The exposure lamp voltage is based on the base lamp voltage and various correction factors.

The exposure lamp voltage is determined with the following formula.

Exposure lamp voltage = Base exposure lamp voltage factor
+
Image Density Setting Factor (Manual ID Mode Only)
+
VL correction factor
+
Reproduction ratio correction factor

3.7.1 Base Lamp Voltage

- 220 V Machines = 126 V (Default)
  The voltage can be changed to any value between 101 V and 150 V in 1 V steps using SP48.
- 115 V Machines = 63 V (Default)
  The voltage can be changed to any value between 50.5 V and 75 V in 0.5 V steps using SP48.

3.7.2 Image Density Setting Factor (Manual ID Mode Only)

Manual ID Level	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Lamp Voltage Change Value (220 V Machines)	–6 V	–6 V	–3 V	±0 V	+3 V	+3 V	+6 V
Lamp Voltage Change Value (115 V Machines)	–3 V	–3 V	–1.5 V	±0 V	+1.5 V	+1.5 V	+3 V

The above table shows changes in the exposure lamp voltage in manual image density mode.

3.7.3 V_L Correction Factor

When the main switch is turned on, if the fusing temperature is lower than 80°C, the machine checks the voltage from the auto image density sensor which receives the light reflected from the white plate located under the left scale. Depending on the voltage, the exposure lamp voltage is changed (Auto V_L Correction). The lamp voltage correction value can be calculated with the following formula:

$$V_L \text{ Correction Voltage} = \alpha \times \frac{\text{ADS Sensor Standard Voltage (2.5 V)} - \text{ADS Sensor Output}}{0.08}$$

$\alpha = 0.5$ (110 V machines)
$\alpha = 1.0$ (220 V machines)

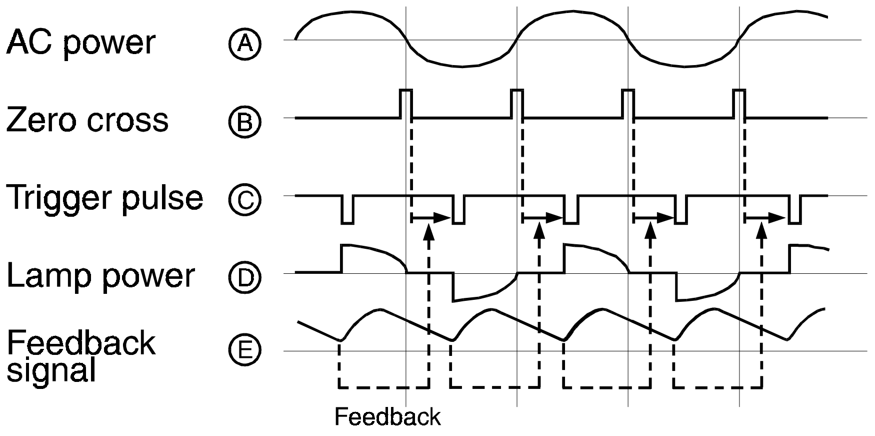
If a setting of 1 to 7 is selected with SP61, the exposure lamp data increases by +0.5V at the selected interval with the machine on time.

3.7.4 Reproduction Ratio Correction Factor

Reproduction ratio	**Change of exposure lamp voltage**	
	(220 V machines)	**(110 V machines)**
50 to 61%	+2 V	+1 V
62 to 139%	±0 V	+0 V
140 to 159%	+2 V	+1 V
160 to 179%	+6 V	+3 V
180 to 200%	+10 V	+5 V

The exposure lamp data increases depending on the selected reproduction ratio as shown in the above table.

3.8 EXPOSURE LAMP CONTROL



A173D513.wmf

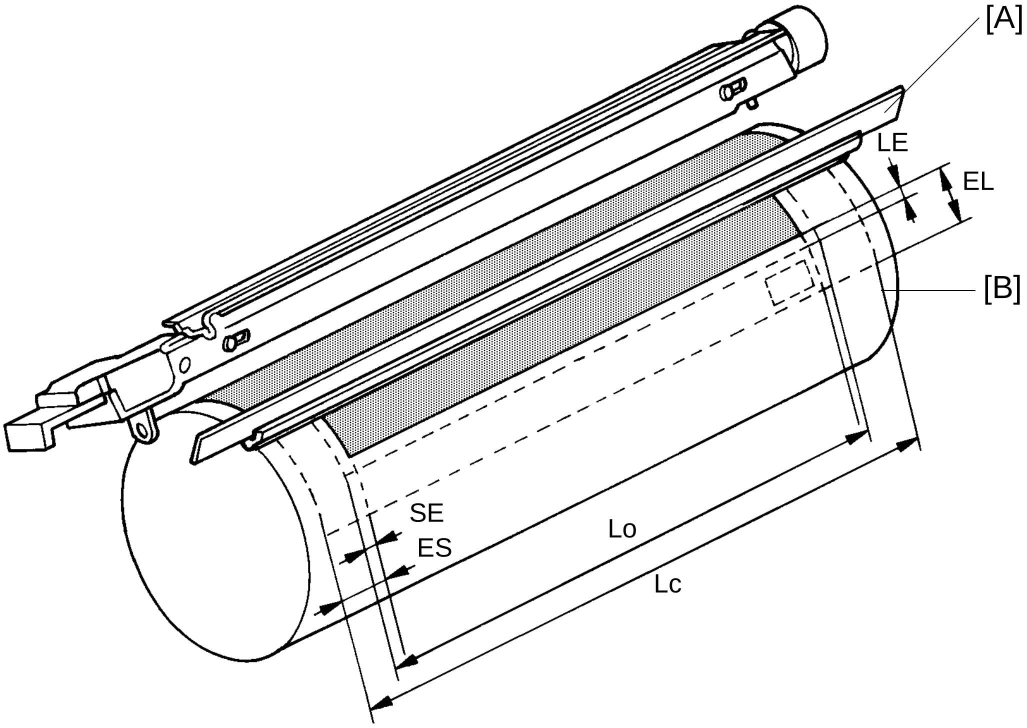
The main board sends lamp trigger pulses to the power supply/ac drive board. Then this board provides ac power to the exposure lamp at the trailing edge of each trigger pulse.

The CPU changes the timing of the trigger pulses depending on the V_L correction factor, reproduction ratio, and so on. To increase the lamp voltage the CPU sends the trigger pulses earlier so that more ac power is applied to the exposure lamp. This feedback control is performed instantly; so, the lamp voltage is always stable even under fluctuating ac power conditions.

The voltage applied to the exposure lamp can be changed with SP48 (Light Intensity Adjustment). The ADS voltage adjustment (SP56) must be done immediately after the light intensity adjustment is done.

4. ERASE

4.1 OVERVIEW



A173D514.img

LE:	Lead edge erase margin	3.5 ±1.5 mm
SE:	Side erase margin	2.0 ±2.0 mm on each side; total of both sides 4 mm or less
LO:	Original width	
LC:	Charged width of drum	
EL:	Lead edge erase	
ES:	Side erase	

The erase lamp [A] consists of a line of LEDs (10 blocks) extending across the full width of the drum [B].

The erase lamp has three functions: lead edge erase, side erase, and trail edge erase. Trail edge erase begins after the trailing edge of the copy paper; therefore, the trailing edge of the copy will not be erased.

4.1.1 Lead Edge Erase

rear front

a	b	c	d	e	f	g	h	j	i	h	g	f	h	g	f	e	d	c	b	a

The entire line of LEDs turns on when the main motor turns on. They stay on until the erase margin slightly overlaps the lead edge of the original image area on the drum (the amount of overlap depends on the lead edge erase margin). This prevents the toner density sensor pattern from being developed every copy cycle and the shadow of the original edge from being developed on the paper. At this point, side erase starts. The width of the lead edge erase margin can be adjusted using SP41.

4.1.2 Side Erase

Based on the combination of copy paper size and reproduction ratio, the LEDs turn on in blocks (labeled "a" – "j" above). This reduces toner consumption and drum cleaning load.

The following table shows which blocks of erase lamp LEDs turn on depending on the paper size and the reproduction ratio:

Blocks on	Paper size	Reproduction ratio (%)
None	A3, A4T	97%~200%
a	11 x 17, 11 x 15, 11 x 81/2, 8K, 16KT	89%~96%
a~b	B4, B5T	81%~88%
a~c		75%~80%
a~d	A4, A5T, 81/2 X 11, 81/2 X 14, 81/2 X13, 51/2 X 81/2T, 81/4 X14, 81/4 X13, 8 X13, 8 X 10, 8 X11	63%~74%
a~e	16K	57%~62%
a~f	B5	55%~56%
a~g		50%~54%
a~h	A5, 51/2 X 81/2	
a~i	For Toner Density Detection	
a~j (all)	Lead Edge Erase, Vr Detection	

4.1.3 Trail Edge Erase

The entire line of LEDs turns on after the trailing edge of the latent image has passed. Therefore, a trailing erase margin cannot be observed on the copy. The LEDs stay on to erase the leading edge of the latent image in the next copy cycle. After the final copy, the erase lamps turn off at the same time as the main motor.

4.1.4 Editing Mode Erase

When copying a thick book original, the binding margin at the center and the edges may appear dirty on copies. To prevent this, the erase center mode, erase edge mode, or erase center and edge mode can be selected as follows:

1. Press the Function key.
2. Press one of the following numbers:

Erase center.....................	Press "4"
Erase edge.......................	Press "3"
Erase center and edge.....	Press "5"

a) Center Erase

The erase margin is made all the time when the entire line of LEDs is on. The margin can be changed with SP26 as shown.

SP setting (SP26)	Margin of the center
0	20 mm
1	10 mm
2	15 mm
3	25 mm

(Factory setting: SP26 = 0)

b) Lead and Trail Edge Erase

The lead and trail edge erase margin is made all the time when the entire line of LEDs is on. The margin can be changed with SP18 as shown.

SP setting (SP18)	Margin of the lead and trail edges
0	10 mm
1	5 mm
2	15 mm
3	20 mm

(Factory setting: SP18 = 0)

c) Side Edge Erase

The side edge erase margin is made when certain blocks of LEDs turn on (depending on the paper size). The margin can be changed with SP13. The margin of the side edges depends on the paper size and reproduction ratio.

The table on the right shows the margin of the side edges for the various paper sizes in the full size copy mode.

Paper Size	Margin of side edges	
	SP13 = 0	SP13 = 1
A3, A4, Non-standard	13 mm	5.5 mm
11" x 17", 11" x 8.5", 11" x 15"	11 mm	3.5 mm
B4, B5, 10" x 14"	13.5 mm	7.5 mm
8.5" x 14", 8.5" x 13", 8.5" x 11", 8.5" x 5.5"	12 mm	6 mm
A4R, A5, 8" x 13", 8" x 10.5", 8" x 10"	11 mm	6 mm
B5R, B6	10 mm	5 mm

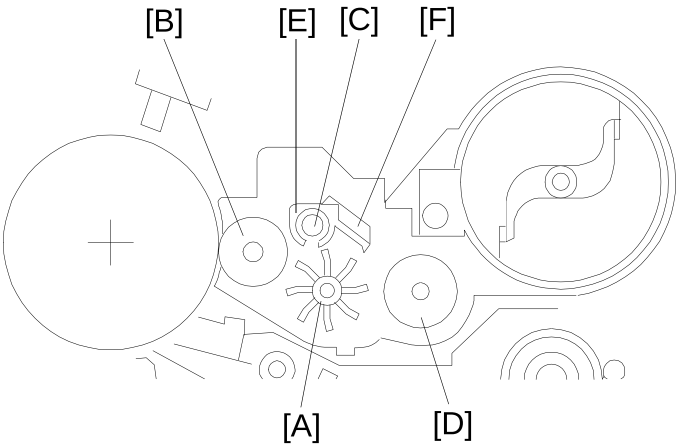
(Factory setting: SP13 = 0)

4.1.5 Erase During Detection Cycles

During the toner density detection cycle (once every ten copy cycles), a block of erase lamps (labeled "j" above) turns off long enough for the sensor pattern to be developed.
The entire line of LEDs turns on when the residual voltage on the OPC drum is being detected (Vr detection).

5. DEVELOPMENT

5.1 OVERVIEW



A173D515.wmf

When the main motor turns on, the paddle roller [A] development roller [B] the auger [C], and the agitator [D] start turning. The paddle roller picks up developer in its paddles and transports it to the development roller. Internal permanent magnets in the development roller attract the developer to the development roller sleeve.

The turning sleeve of the development roller then carries the developer past the doctor blade [E]. The doctor blade trims the developer to the desired thickness and creates backspill to the cross-mixing mechanism.

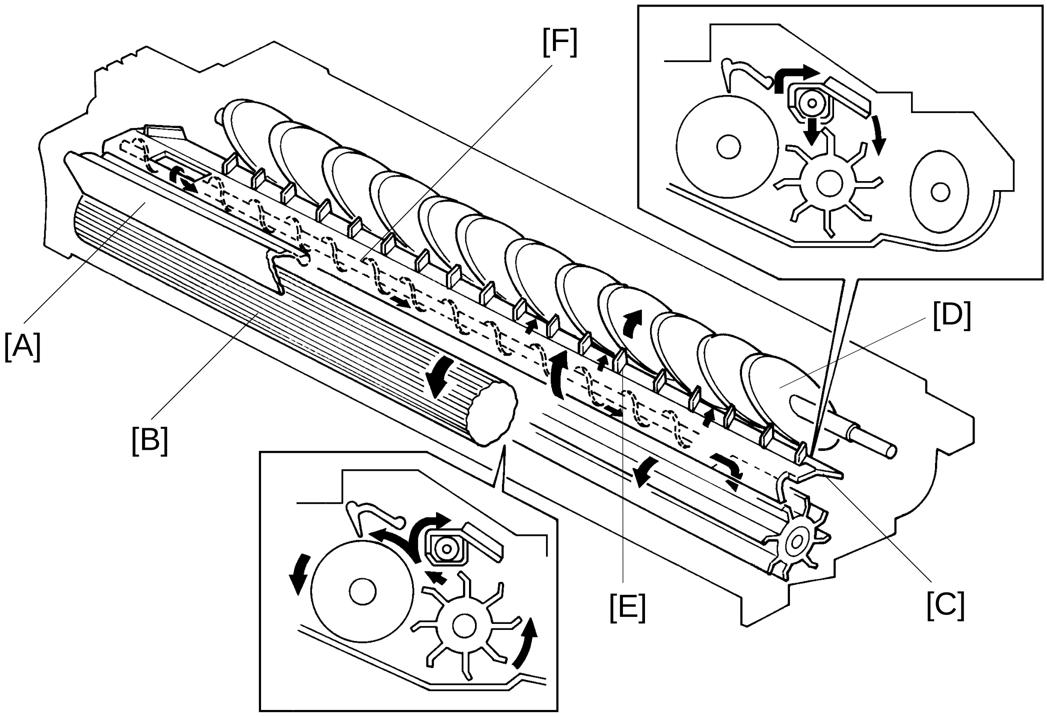
The development roller continues to turn, carrying the developer to the drum. When the developer brush contacts the drum surface, the negatively charged areas of the drum surface attract and hold the positively charged toner. In this way, the latent image is developed.

The development roller is given a negative bias to prevent toner from being attracted to non-image areas on the drum that may have residual negative charge. The bias also controls image density.

After turning about 100 degrees more, the development roller releases the developer to the developer tank. The developer is agitated by the paddle roller, agitator [D], and the cross-mixing mechanism.

Rotation of the paddle roller and development roller tend to cause air pressure inside the unit to become higher than the air pressure around the development unit. A hole, fitted with a filter [F], has been added to the top of the unit to relieve air pressure and to minimize toner scattering.

5.2 CROSS-MIXING



A173D516.img

This copier uses a standard cross-mixing mechanism to keep the toner and developer evenly mixed. It also helps agitate the developer to prevent developer clumps from forming and helps create the triboelectric charge.

The developer on the turning development roller is split into two parts by the doctor blade [A]. The part that stays on the development roller [B] forms the magnetic brush and develops the latent image on the drum. The part that is trimmed off by the doctor blade goes to the backspill plate [C].

As the developer slides down the backspill plate to the agitator [D], the mixing vanes [E] move it slightly toward the rear of the unit. Part of the developer falls into the auger inlet and is transported to the front of the unit by the auger [F].

The agitator moves the developer slightly to the front as it turns. The effect of this movement is that the developer stays level in the development unit.

5.3 DEVELOPMENT BIAS FOR IMAGE DENSITY CONTROL

Image density is controlled by changing two items: (1) the strength of the bias voltage applied to the development roller sleeve, and (2) the strength of the voltage applied to the exposure lamp.

Applying a bias voltage to the development sleeve reduces the potential between the development roller and the drum, thereby reducing the amount of toner transferred. As the bias voltage becomes greater, the copy image becomes lighter. Similarly, increasing the voltage to the exposure lamp causes an increase in light intensity which also results in lighter copies.

The method of control is different depending on whether the image density is manually selected or the automatic ID mode is used.

The development bias applied to the development roller sleeve has the following three factors:

Development bias voltage = Base bias voltage factor
(Manual or automatic image density control)
+
Base bias voltage adjustment factor
+
Vr correction factor

The base bias voltage for non-image areas (between copies) is –160 volts. The above correction factors are also applied.

5.3.1 Base Bias Voltage Factor in Manual Image Density Control

Darker ⟷ Lighter

Manual ID level	1	2	3	4	5	6	7
Base bias voltage	–120	–160	–160	–160	–160	–200	–240

In manual ID control mode, the base bias voltage depends on the manually selected ID level. The voltage applied at each ID level is shown in the above table. The base exposure lamp voltage also varies depending on the manual ID level. (See "Exposure Lamp Voltage Control" for more information.)

5.3.2 Base Bias Voltage Factor in Automatic Image Density Control

In automatic image density control mode, the base exposure lamp voltage is fixed to level 4 of the manual ID setting. (See "Exposure Lamp Voltage Control" for more information.) Image density is controlled by changing only the base bias voltage.

The base bias voltage depends on the background image density of the original, which is measured using the auto ID sensor. (See "Automatic Image Density Detection" for more information.)

The CPU checks the voltage output from the automatic ID circuit. This circuit has a peak hold function. The peak hold voltage corresponds to the maximum reflectivity of the original. The CPU then determines the proper base bias level with reference to the peak hold voltage.

The following table gives the base bias voltages at each ADS output level.

The base bias voltage depends on the setting of SP34 as shown in the following table.

K	**Base bias voltage**	
	lighter (SP34 = 2)	**Normal or Darker (SP34 = 0 or 1)**
$K \geq TL1$	–200 volts	–160 volts
$0.80 > K \geq 0.75$	–240 volts	–200 volts
$0.75 > K \geq 0.70$	–280 volts	–240 volts
$0.70 > K \geq 0.60$	–320 volts	–280 volts
$0.60 > K \geq 0.29$	–360 volts	–320 volts
$0.29 > K$	–380 volts	–340 volts

$$K = \frac{\text{ADS Output Voltage (Peak Hold Voltage)}}{\text{ADS Reference Voltage (SP56)}}$$

5.3.3 Base Bias Voltage Adjustment Factor

Base Bias Adjustment (SP37)

Image density	SP setting (SP37)	Change of base bias voltage
Normal	0	±0 volts
Darkest	1	+40 volts
Darker	2	+20 volts
Lighter	3	–20 volts
Lightest	4	–40 volts

The base bias voltage can be changed with SP37 to adjust the image density level. The above table gives the base bias voltage for each SP mode setting. This adjustment should be done only when the exposure lamp voltage adjustment (SP48) fails to achieve the desired image density.

5.3.4 Vr Correction Factor

As the OPC drum is used, drum residual voltage (Vr) gradually increases. Vr correction compensates for residual voltage on the drum. Vr correction is done every 1,000 copies based on the data in the drum counter (SP69) and the Vr correction ratio (L) (SP67). The following chart shows how the bias voltage changes depending on the Vr correction ratio (L).

Vr Correction Factor

L	Change of bias voltage
100 to 89 (%)	±0 (volts)
88 to 76 (%)	–40 (volts)
75 to 62 (%)	–80 (volts)
61 to 45 (%)	–120 (volts)
44 to 0 (%)	–160 (volts)

NOTE: L = Vrp/Vsg x 100 (Vr correction ratio)

Vrp: ID sensor output for the Vr correction pattern
Vsg: ID sensor output for the bare drum

When the Vr correction is made every 1,000 copies, all blocks of the erase lamp turn on and the development bias becomes 0 volt to develop the Vr correction pattern.

5.4 TONER SAVER MODE

If toner saver mode is selected on the operation panel, the bias voltage, grid voltage, and lamp voltage are charged as follows:

Bias voltage = Normal –40 V (This can be changed using SP 36.)
Grid voltage = Normal +160 V
Lamp voltage = Normal –3 V (115 V machines), –6 V (220 V machines)

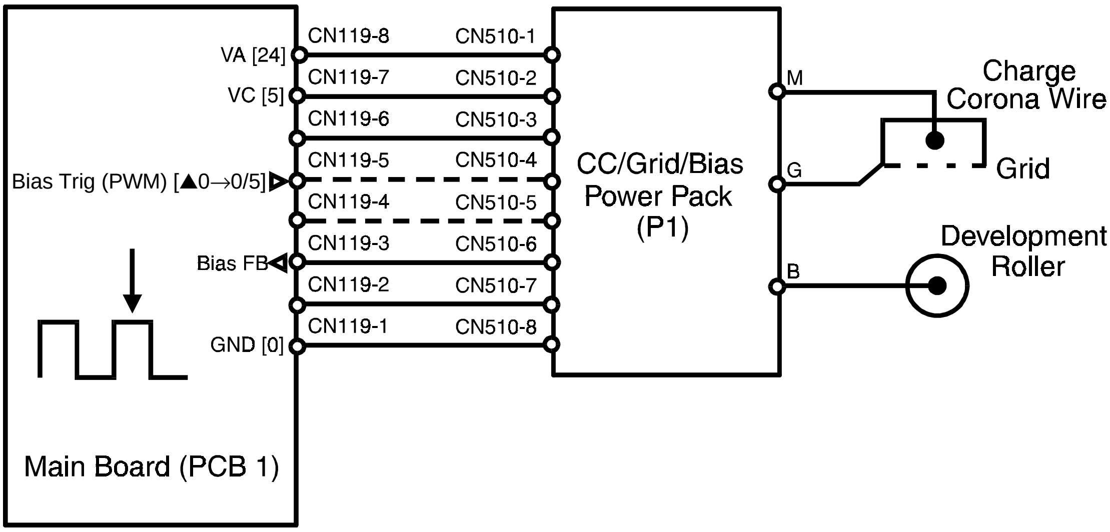
As a result, the toner consumption of high original density areas is reduced. (The image will slightly be lighter than normal mode.)

The toner saving ratio can be selected by SP36 as shown in the following table.

SP36	Bias	Toner Save (Design Target)
0 (Default)	Normal –40	▲ 30%
1	Normal	▲ 20%
2	Normal –80	▲ 40%

NOTE: The toner saving ratio in the above table are standard values using A4 6% original measured in laboratory tests under controlled conditions. The actual ratios will vary depending on environmental conditions, copy modes, original, and paper.

5.5 DEVELOPMENT BIAS CIRCUIT


VA [24]
VC [5]
Bias Trig (PWM) [▲0→0/5]
Bias FB
GND [0]
Main Board (PCB 1)
CN119-8
CN119-7
CN119-6
CN119-5
CN119-4
CN119-3
CN119-2
CN119-1
CN510-1
CN510-2
CN510-3
CN510-4
CN510-5
CN510-6
CN510-7
CN510-8
CC/Grid/Bias Power Pack (P1)
M
G
B
Charge Corona Wire
Grid
Development Roller

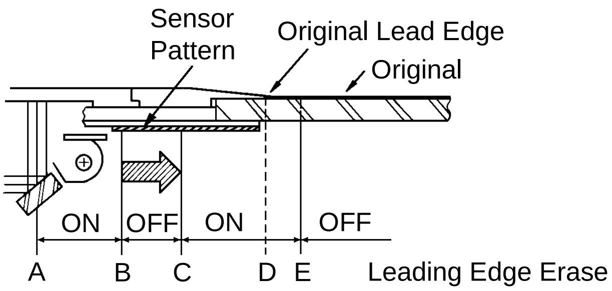
A173D517.wmf

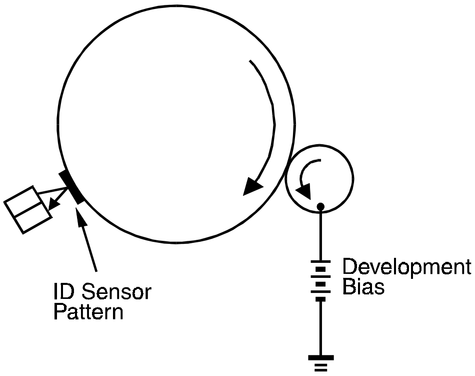
The main board supplies +24 volts to the CC/Grid/Bias power pack at CN510-1 as the power supply source. When the Start key is pressed, the CPU starts sending the bias trigger pulse to CN510-4. This energizes the development bias circuit within the CC/Grid/Bias power pack, which applies a high negative voltage to the development roller. The development bias is applied whenever the drum is rotating except when the Vr pattern is developed.

The bias trigger pulse applied to CN510-4 is a pulse width modulated signal (PWM signal). This signal is also used to change the voltage level of the development roller. As the width of the trigger pulses increases, the voltage of the development roller also increases. The CPU monitors the development bias voltage at CN510-6 and controls the width of the bias trigger pulses based on this feedback.

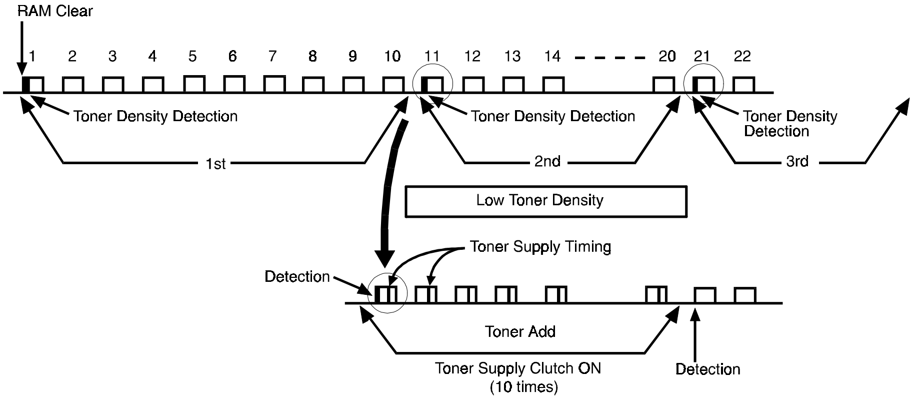
6. TONER DENSITY DETECTION AND TONER SUPPLY

6.1 DETECT SUPPLY MODE


Sensor Pattern
Original Lead Edge
Original
ON
OFF
ON
OFF
A
B
C
D
E
Leading Edge Erase


ID Sensor Pattern
Development Bias

A173D518.img A173D519.wmf


RAM Clear
1
2
3
4
5
6
7
8
9
10
11
12
13
14
20
21
22
Toner Density Detection
1st
Toner Density Detection
2nd
Toner Density Detection
3rd
Low Toner Density
Toner Supply Timing
Detection
Toner Add
Toner Supply Clutch ON (10 times)
Detection

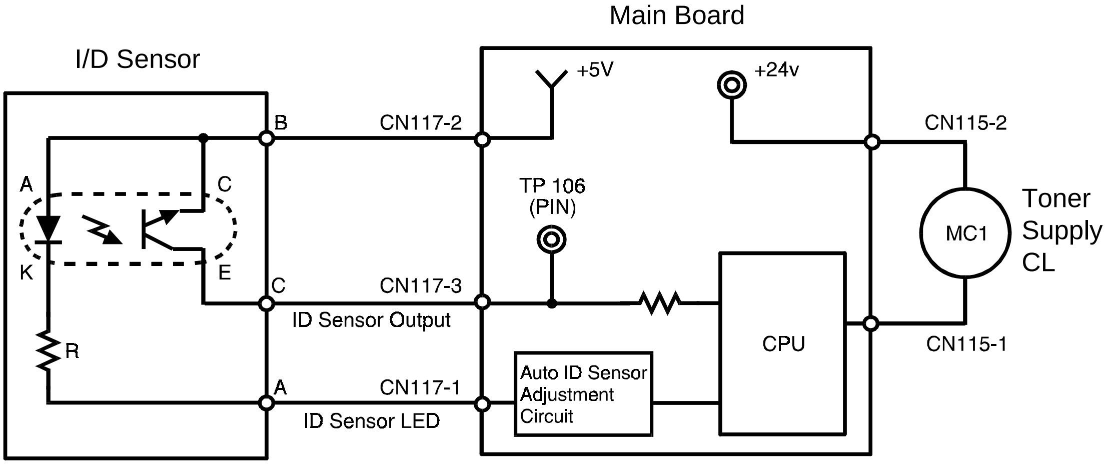
A173D520.wmf

The CPU checks toner density by directly detecting the image density every 10 copy cycles. If the RAM is cleared (SP99), or a new RAM is installed, the CPU checks the image density at the beginning of the first copy cycle.

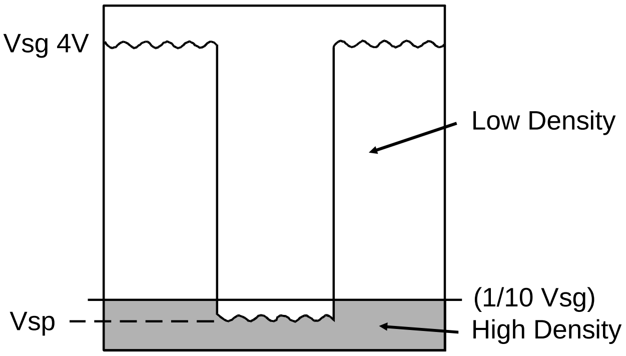
During the check cycles, the sensor pattern is exposed prior to exposure of the original. After the sensor pattern is developed, its reflectivity is checked by the image density sensor (a photosensor). The CPU notes the reflectivity. If the reflected light is too strong, indicating a too low toner density condition, toner is added to the development unit.

The toner is not added all at once. The CPU energizes the toner supply clutch for the proper amount of time to add a selected amount of toner over the next 10 cycles.

6.2 ID SENSOR OPERATION IN DETECT SUPPLY MODE


Main Board
I/D Sensor
+5V
+24v
B
CN117-2
CN115-2
A
C
K
E
TP 106
(PIN)
MC1
Toner
Supply
CL
C
CN117-3
ID Sensor Output
R
CPU
CN115-1
A
CN117-1
ID Sensor LED
Auto ID Sensor
Adjustment
Circuit

A173D521.wmf



A173D522.wmf

The image density sensor checks the density of the sensor pattern image once every 10 copy cycles. The CPU receives two voltage values directly from the sensor: the value for the bare drum (Vsg) and the value for the sensor pattern (Vsp). These two values are then compared to determine whether more toner should be added.

1. Vsp ≤ 1/10 Vsg .....No toner is added (high density).
2. Vsp > 1/10 Vsg .....Toner is added (low density).

When the image density is too low, the CPU activates the toner supply clutch to add toner over the next 10 copy cycles. The amount of toner added depends on the value of Vsp, the selected toner supply ratio (SP31), ID sensor data, and the paper size in use. (See ‘Toner Supply Amount’ for more information.)

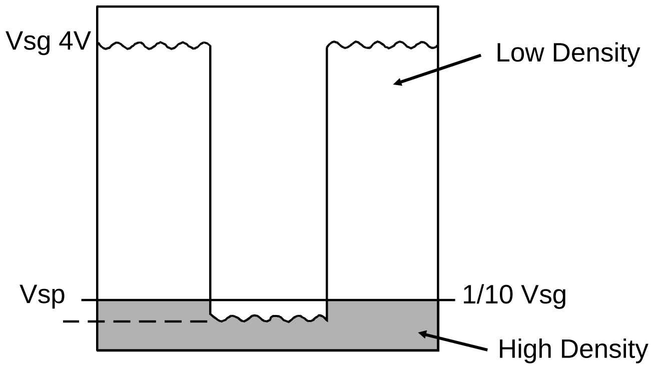
When SP35 is set to "1" (factory setting = "0"), the CPU changes the interval of the ID check from every 10 copies to every 5 copies.

6.3 FIXED SUPPLY MODE

When the setting of SP30 is "1" (factory setting = "0"), the fixed supply mode is selected. In this case, a fixed amount of toner is added every copy cycle depending on the selected toner supply ratio (SP32) and the paper size in use.

6.4 ID SENSOR OPERATION IN FIXED SUPPLY MODE

In fixed supply mode, toner is supplied every copy cycle depending on the fixed toner supply ratio data (SP32) and the paper size. However, the toner supply clutch is de-energized to prevent over-toning when Vsp is lower than 1/10 Vsg.



A173D522.wmf

6.5 ABNORMAL CONDITION IN TONER DENSITY DETECTION

If the Vsg goes below 2.5 volts (Vsg abnormal) or if Vsp goes above 2.5 volts (Vsp abnormal) 5 times in a row, the CPU determines that toner density detection is abnormal. The CPU changes from the detect supply mode to the fixed supply mode. At the same time either the Auto ID indicator or the selected manual ID level starts blinking, and the machine can be operated.

Abnormal Condition In Toner Density Detection

SP55 display		**Conditions**
Vsp	**Vsg**	
varies	0.00	Vsg ≤ 2.5 (Vsg abnormal)
varies	5.00	Vsp ≥ 2.5 (Vsp abnormal)

6.6 DEVELOPMENT BIAS FOR TONER DENSITY DETECTION

The development bias for the toner density detection consists of the following two factors:

Development bias voltage = Toner density adjustment factor
+
Vd correction factor
+
ID sensor bias setting (SP33)

The development voltage for the Vr correction is 0 volt.

6.6.1 Toner Density Adjustment Factor

Toner density	SP33 setting	Development bias voltage
Normal	0	–260 volts
Low	1	–240 volts
High	2	–280 volts
Higher	3	–300 volts
Lower	4	–220 volts
Highest	5	–320 volts
Lowest	6	–200 volts
Developer initial setting		–300 volts

The development bias can be changed with SP33 to adjust the toner density level. The above chart shows the development bias voltage corresponding to setting of SP33. This adjustment should be used only when the exposure lamp voltage adjustment (SP48) and the base bias adjustment (SP37) for copy image cannot achieve the desired image density.

6.6.2 Vd Correction Factor

The development bias for toner density detection is changed automatically to compensate for variations of the triboelectric charge of the developer.

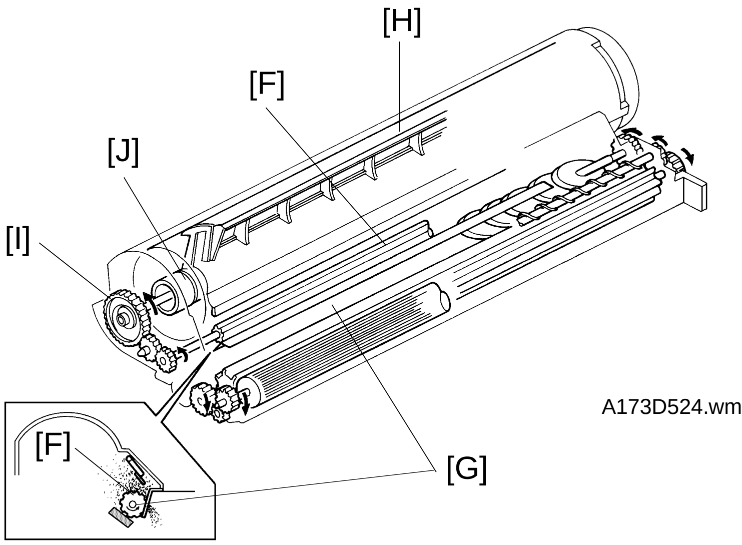
The CPU monitors Vsp and Vsg and calculates the average of Vsp/Vsg x 100(%) during the developer initial setting (SP65). The result of the calculation can be monitored with SP64.

The CPU has a software counter (no SP mode display) to count the number of copies made with the developer. The counter resets to "0" when SP65 is performed.

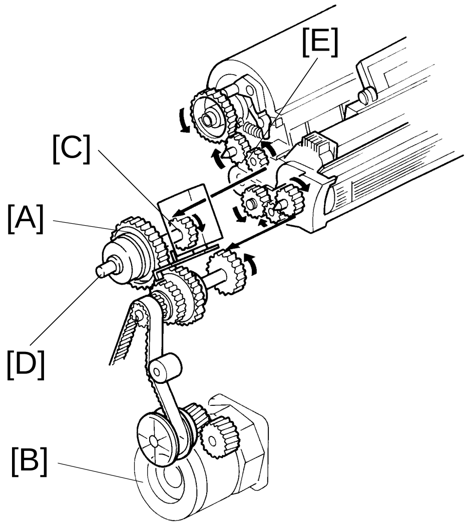
Vd correction is made based on the results of the calculation and the data in the software counter as shown in the following table:

SP setting (SP64)	**Vsp/Vsg x 100 (%)**	**Change of development bias voltage**		
		0 to 500 copies	**501 ~ 30000 copies**	**30001 ~**
0	0 ~ 8	–20	±0	–20
1	9 ~ 22	±0	±0	–20
2	23 ~	±0	+20	±0

6.7 TONER SUPPLY AND AGITATOR DRIVE MECHANISM



A173D524.wmf



A173D524.img

The toner supply clutch gear [A] turns when the main motor [B] is on and the toner supply clutch is energized. The transmission of this rotation to the toner supply drive gear [C] is controlled by the toner supply clutch [D].

When the toner supply clutch energizes, the toner supply clutch engages and starts turning the toner supply drive gear. The toner supply drive gear turns the toner supply roller gear [E]. Toner catches in the grooves on the toner supply roller [F]. Then, as the grooves turn past the pin hole plate [G], the toner drops into the development unit through the pin holes.

The toner agitator [H] mechanism, which is contained in the toner cartridge, prevents toner from blocking the pin holes. The toner agitator gear [I] turns whenever the toner supply clutch is engaged. Rotation passes through the toner cartridge casing to the agitator junction [J].

6.8 TONER SUPPLY AMOUNT

This copier has two different ways of controlling the amount of toner supplied. Normally, detect supply mode controls toner supply for the development unit; however, fixed supply mode also can be selected with SP30.

6.8.1 Detect Supply Mode (SP30 = 0)

The amount of toner supplied depends on the ID sensor data, the detect toner supply ratio setting, and the paper size. The toner supply clutch on time in each copy cycle is calculated as follows:

Toner Supply Clutch On Time = I x T x P (pulses)

Where:
I = ID Sensor Data
T = Detect Toner Supply Ratio Factor
P = Paper Size Factor

I, T, and P are obtained from the Vsp data, the setting of SP31, and the paper size respectively, as shown in the following table.

ID Sensor Data

Vsp (Vsg = 4.0 V)	**Toner supply level** (Toner supply ratio, if SP31 = 0)	**ID sensor data**
0 to 0.41 V	No toner supply (0 %)	0
0.41 to 0.43 V	1 (3.75 %)	14
0.43 to 0.47 V	2 (7.5 %)	27
0.47 to 0.61 V	3 (15 %)	54

Detect Toner Supply Ratio Data (SP31)

SP data (SP31)	**Toner supply ratio**	**Toner supply ratio data**
0	15%	2
1	7%	1
2	30%	4
3	60%	8

Paper Size Data

Paper size	**Paper size data**
Paper size ≤ A4 or LT	1
Paper size > A4 or LT	2

For example: Vsp = 0.45 volts, which means the toner supply level is "2" and the ID sensor data = 27.

SP31 is set to "0".
The toner supply ratio is 15 % and the toner supply factor = 2.

Paper size is A4 or LT.
The paper size factor = 1.

Toner Supply Clutch On Time = I x T x P
= 27 x 2 x 1
= 54 (pulses)
= 216 (ms.) (1 pulse = 4.0 ms.)

6.8.2 Fixed Supply Mode (SP30 = 1)

The amount of toner supplied depends on the fixed toner supply ratio data and the paper size data. The toner supply clutch on time in each copy cycle is calculated as follows:

Toner Supply Clutch On Time = T x P x 2 (pulses)

Where: T = Fixed Toner Supply Ratio Factor
P = Paper Size Factor

T and P are obtained from the setting of SP32 and the paper size respectivity, as shown below.

Fixed Toner Supply Ratio Factor

SP data (SP32)	Toner supply ratio	Toner supply ratio factor (T)
0	7.0%	2
1	3.5%	1
2	10.5%	3
3	14.0%	4

Paper Size Factor

Paper size	Paper size factor (P)
A3	40
B4	30
A4	20
B5	16
A5	10
B6	11
11" x 17"	38
8½" x 14"	26
8½" x 11"	19
5½" x 8½"	10
Paper size not detected	0

For example: The data of SP32 is set to "0".
The toner supply ratio is 7.0% and the toner supply data = 2.

Paper size is A4. The paper size data = 20.

Toner Supply Clutch On Time = T x P x 2
= 2 x 20 x 2
= 80 (pulses)
= 320 (ms.) (1 pulse = 4.0 ms.)

6.9 TONER END DETECTION

The image density sensor is used to detect a toner end condition in both detect and fixed supply modes.

6.9.1 Toner Near End Condition

When (Vsp/Vsg x 100) becomes greater than 15.2, the toner density detection cycle changes from every 10 copies to 5 copies.

When this condition is detected three times consecutively, the toner supply ratio becomes two times the amount of toner supply level 3. The resulting toner supply ratio is 60%.

Then, when this condition is detected five times consecutively, the CPU determines that there is a near end condition and starts blinking the Add Toner indicators.

6.9.2 Toner End Condition

After the Add Toner indicator starts blinking (Toner Near End Condition), the operator can make 50 copies. If the toner cartridge is not replaced within 50 copies, copying is disabled and a toner end condition is determined. In this condition, the Add Toner indicator lights.

Example:

Copy number	**Toner density detection cycle**	**Vsp/Vsg x 100**	**Toner supply ratio (If SP31 = 0)**	**Indicator**
1st ~ 5th copies	1st copy	15.3	30%	
6th ~ 10th copies	6th copy	15.3	30%	
11th ~ 15th copies	11th copy	15.3	60%	
16th ~ 20th copies	16th copy	15.3	60%	
21st copy	21st copy	15.3	60%	Add Toner indicator starts blinking (toner near end condition)
I I I	I I I	I I I	I I I	Add Toner indicator blinks (toner near end condition)
71st copy	—	—	—	Add Toner indicator lights (toner end condition)

When (Vsp/Vsg x 100) becomes greater than 28.0 two times consecutively, the CPU determines immediately that there is a toner end condition and copying is disabled. This causes the Add Toner indicator to light.

Example:

Copy number	**Toner density detection cycle**	**Vsp/Vsg x 100**	**Toner supply ratio (If SP31 = 0)**	**Indicator**
1st~ 5th copies	1st copy	30.5	30%	
6th~10th copies	6th copy	28.5	30%	
16th copy	16th copy	28.5	—	Add Toner indicator lights (toner end condition)

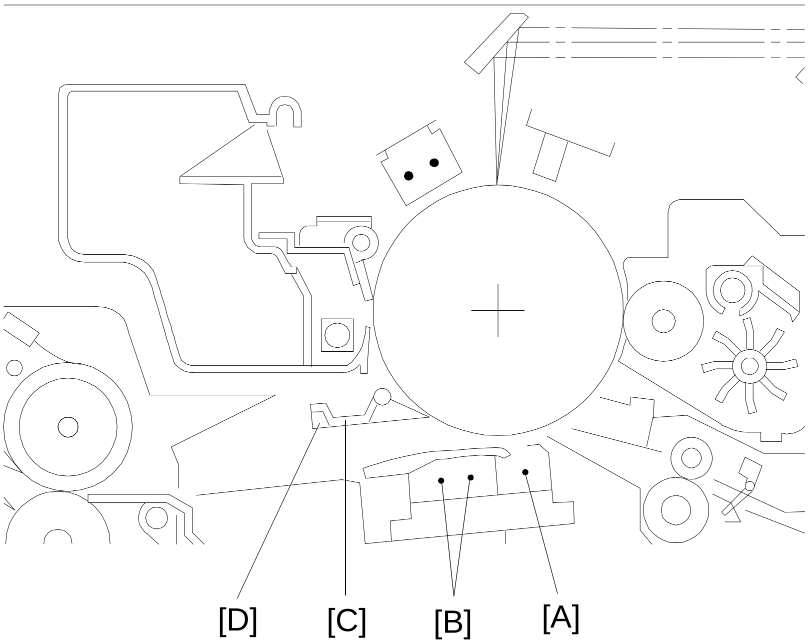
6.9.3 Toner End Recovery

After the toner cartridge is replaced and the front cover is closed, the CPU turns on the main motor, and turns on the toner supply clutch for 10 seconds to supply toner to the empty toner supply unit from the toner cartridge.

Normally, the toner end condition is cleared when the front door is opened and closed. However, when SP38 is changed to 1, this does not happen. Instead, the machine does the following:

- The CPU checks Vsg and Vsp four times at the end of the above toner supply operation to clear the toner end condition.
- When the average of (Vsp/Vsg x 100) becomes less than 15.2 or less than 95% of the last detection before replacing the toner cartridge, the toner end or near end condition is cleared.
- If the toner end or near end condition is not cleared, copying is disabled. This prevents the customer from clearing the near end or toner end condition by simply opening and closing the front cover or turning the main switch off and on.

7. IMAGE TRANSFER AND PAPER SEPARATION



A173D525.wmf

7.1 IMAGE TRANSFER

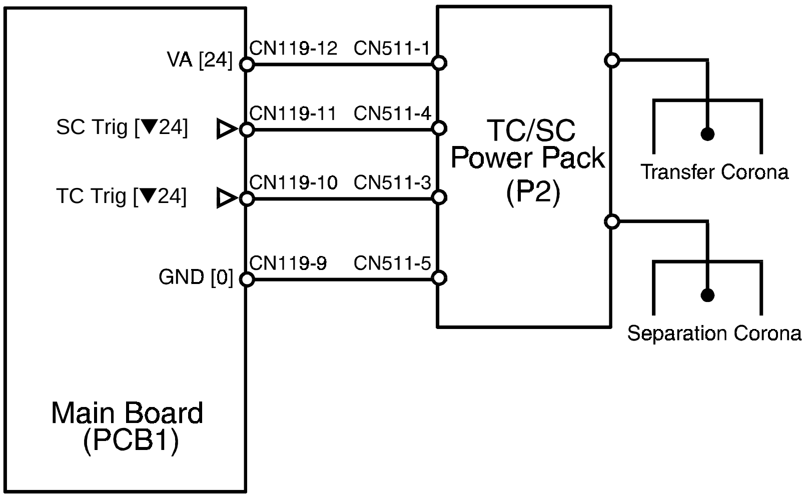
A high negative voltage (–4.5 kilovolts) is applied to the transfer corona wire [A]. A negative charge is applied to the copy paper, and it attracts the positively charged toner away from the drum and onto the paper. However, the paper is held against the drum by the positive counter charge on the drum.

7.2 PAPER SEPARATION

After image transfer the copy must be separated from the drum. To break the attraction between the paper and the drum, the separation corona wire [B] applies an ac corona to the reverse side of the paper. The stiffness and weight of the paper causes it to separate from the drum.

The negative charge on the paper (from the transfer corona) is not completely discharged until the paper is far enough from the drum that the toner will not be reattracted to the drum. The two pick-off pawls [C] ensure that thin, low stiffness paper and upwardly curled paper separate completely. The spurs [D] prevent the unfused toner on the paper from being smeared by the pick-off pawls.

7.3 TRANSFER/SEPARATION CORONA CIRCUIT


VA [24]
SC Trig [▼24]
TC Trig [▼24]
GND [0]
Main Board (PCB1)
CN119-12
CN511-1
CN119-11
CN511-4
CN119-10
CN511-3
CN119-9
CN511-5
TC/SC Power Pack (P2)
Transfer Corona
Separation Corona

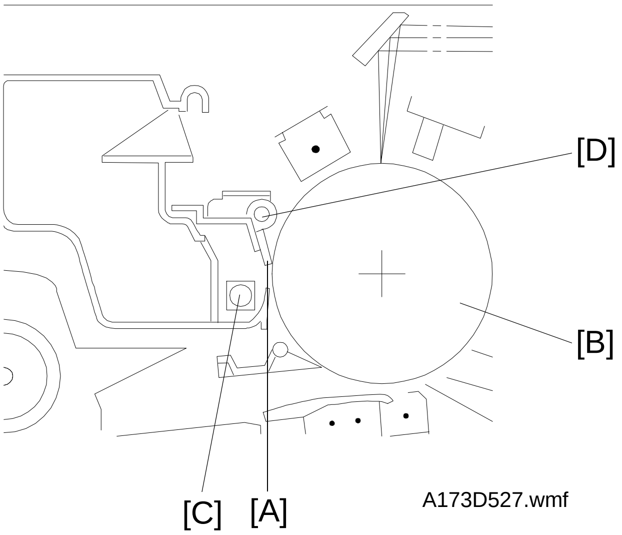
A173D526.wmf

The TC/SC power pack has a dc to dc converter and a dc to ac inverter. The dc to dc converter changes +24 volts to –4.5 kilovolts for the transfer corona. The inverter changes +24 volts to the 3.0 kilovolts ac (500 Hz) for the separation corona.

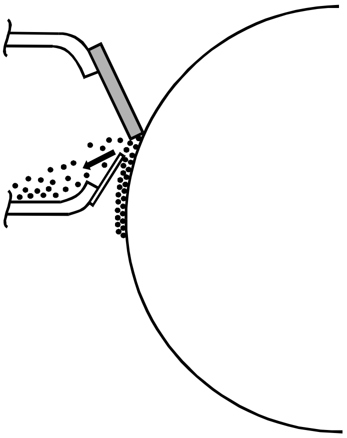
The separation corona circuit in the TC/SC power pack has a current leak detection circuit for safety. When this circuit detects that more than 2 milliamperes is supplied to the separation corona, the separation corona turns off immediately. When the main switch is turned off and on, or the front cover or the exit cover is opened and closed, this condition is cleared.

8. CLEANING

8.1 OVERVIEW



A173D527.wmf



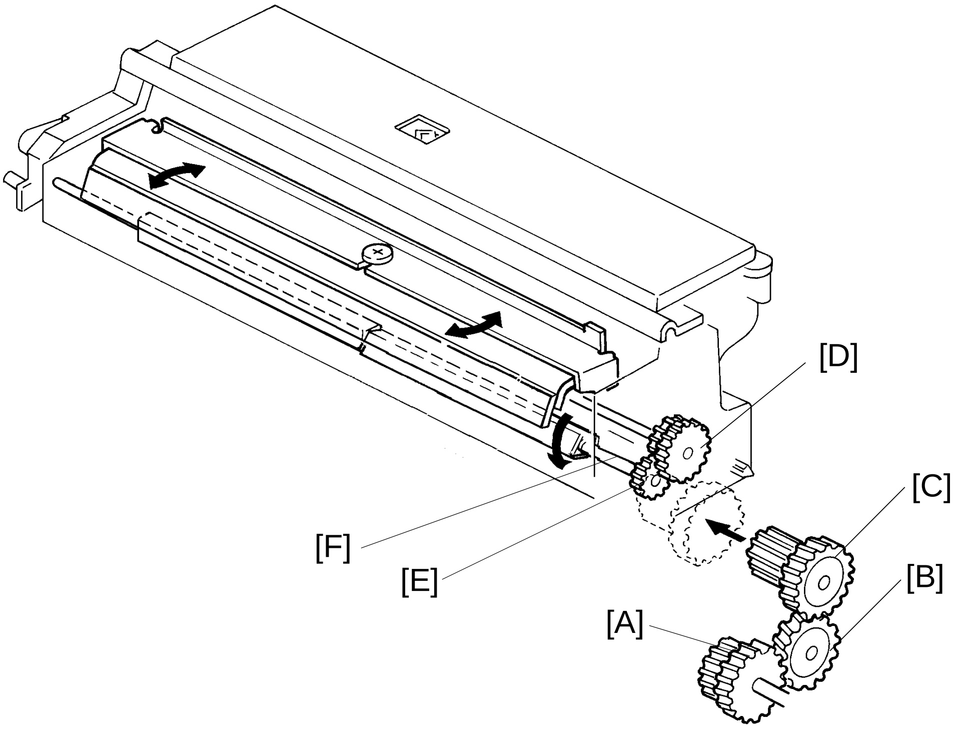
A173D528.wmf

The cleaning blade [A] removes any toner remaining on the drum [B] after the image is transferred to the paper.

The removed toner falls into the cleaning unit. The toner collection roller [C] carries the used toner to the used toner tank. The light from the quenching lamp [D] neutralizes any charge remaining on the drum in preparation for the next copy cycle.

The cleaning blade releases when the release knob is pressed. This prevents the drum from being damaged when the cleaning unit is removed or installed.

8.2 DRIVE MECHANISM



A173D529.img

The rotation of the main motor is transmitted to the cleaning unit through the main motor gear [A], the relay gear [B], and the cleaning drive gear [C].

The gear [D] driven by the cleaning drive gear passes the rotation to the toner collection roller gear [E].

The cleaning blade [F] is mounted in the center of the blade and is tilted to apply even pressure.

8.3 USED TONER OVERFLOW DETECTION

The CPU uses an overflow counter to detect used toner overflow.

The overflow counter counts the total number of copies since the last time the toner end counter was cleared. When the overflow counter reaches 60K copies, the CPU starts to blink "E70" on the operation panel. An additional 250 copies can be made before the Start indicator turns red and copying is disabled.

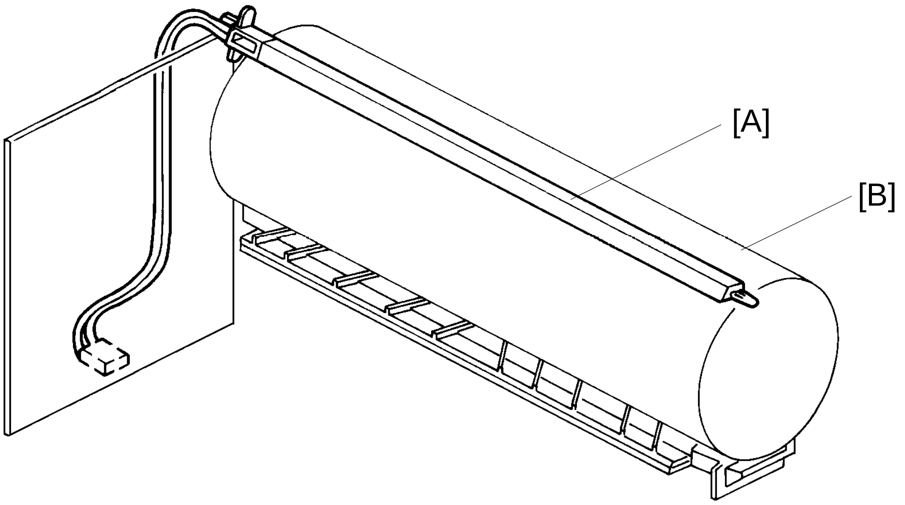
After disposing of the toner in the used toner tank, use SP83 to clear the overflow counter.

Toner end counter clear (SP83)

Setting (SP83)	Memory counter
0	Not cleared
1	Cleared

NOTE: If SP115 is set to 1, the machine uses the optional toner overflow sensor to detect toner overflow. "E70" blinks when the toner overflow sensor is actuated, and copying is disabled when an additional 250 copies have been mode.

9. QUENCHING



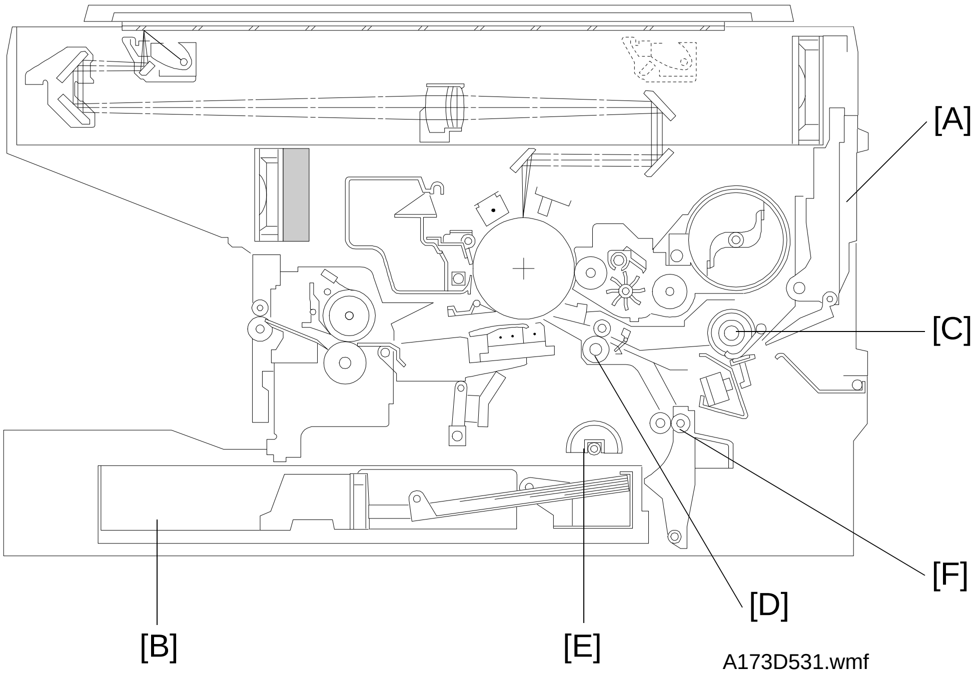
A173D530.img

In preparation for the next copy cycle, light from the quenching lamp (QL) [A] neutralizes any charge remaining on the drum [B].

LEDs are used for quenching and the lamp is turned on whenever the main motor rotates.

10. PAPER FEED AND REGISTRATION

10.1 OVERVIEW



A173D531.wmf

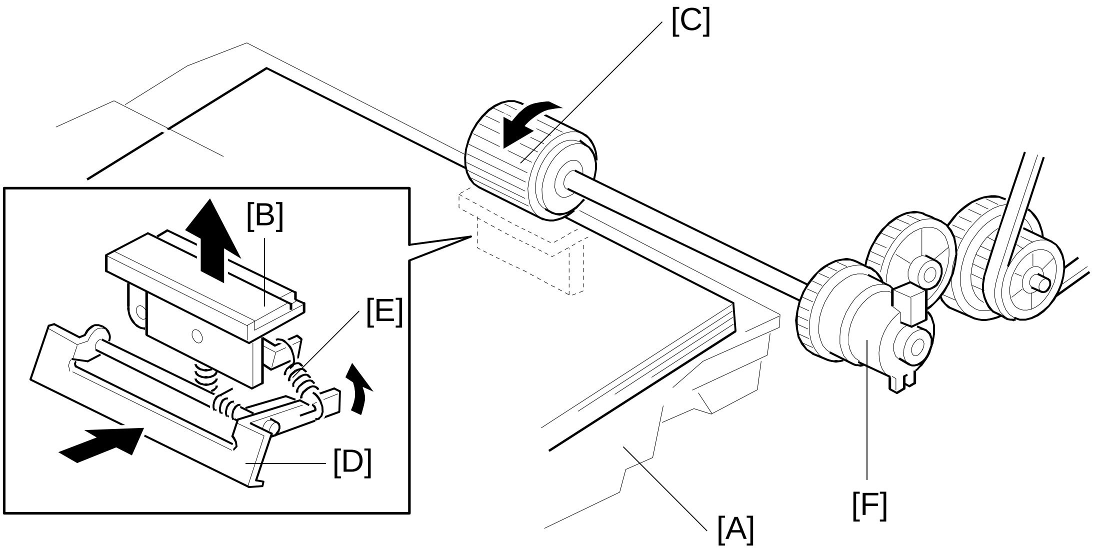
This model has two paper feed stations (1 cassette + 1 paper tray) and a manual feed table [A].

The first feed station uses a cassette which can hold 250 sheets, and the second feed stations use a paper tray [B] which can also hold 250 sheets. The manual feed table utilizes the feed mechanism of the first feed station.

The first feed station uses a friction pad separation system. Rotation of the feed roller [C] drives the top sheet of paper from the cassette to the registration roller [D].

The second feed station uses a semicircular feed roller [F] and corner separator system. The semicircular feed roller makes one rotation to drive the top sheet of paper to the relay rollers [F], which then feed the sheet to the registration rollers. The corner separator allows only one sheet to feed.

10.2 1ST FEED STATION PAPER FEED MECHANISM



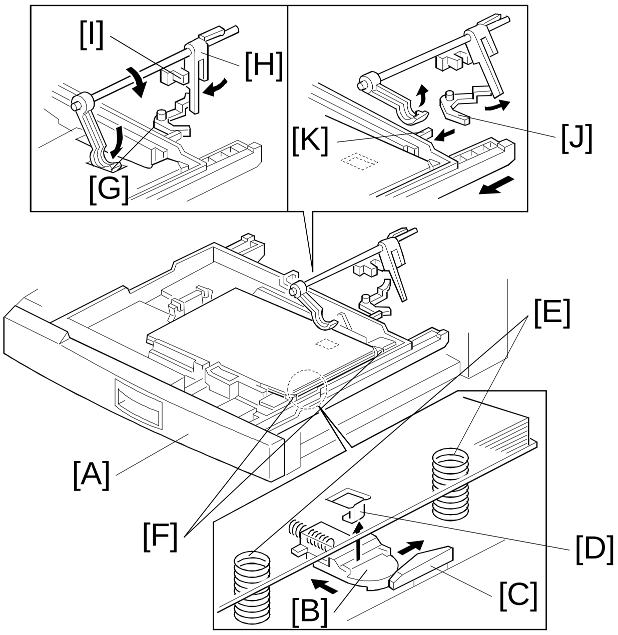
A173D532.wmf

When the cassette [A] is not set at the 1st feed station, the friction pad [B] is not in contact with the paper feed roller [C].

When the cassette is inserted into the copier, the lever [D] is pushed in the direction of the arrow. The friction pad moves up as a result of the spring [E] tension.

The main motor drive is transmitted to the paper feed roller when the 1st paper feed clutch [F] is energized. The top sheet of the paper stack is separated and transported to the registration roller.

10.3 2ND FEED STATION PAPER LIFT MECHANISM AND PAPER END DETECTION



A173D533.wmf

10.3.1 Paper Lift Mechanism

When the paper tray [A] is closed after paper is loaded, the plate release slider [B], which is mounted on the bottom part of the paper tray, is pushed by the projection [C] on the copier frame and the release slider comes off the bottom plate hook [D].

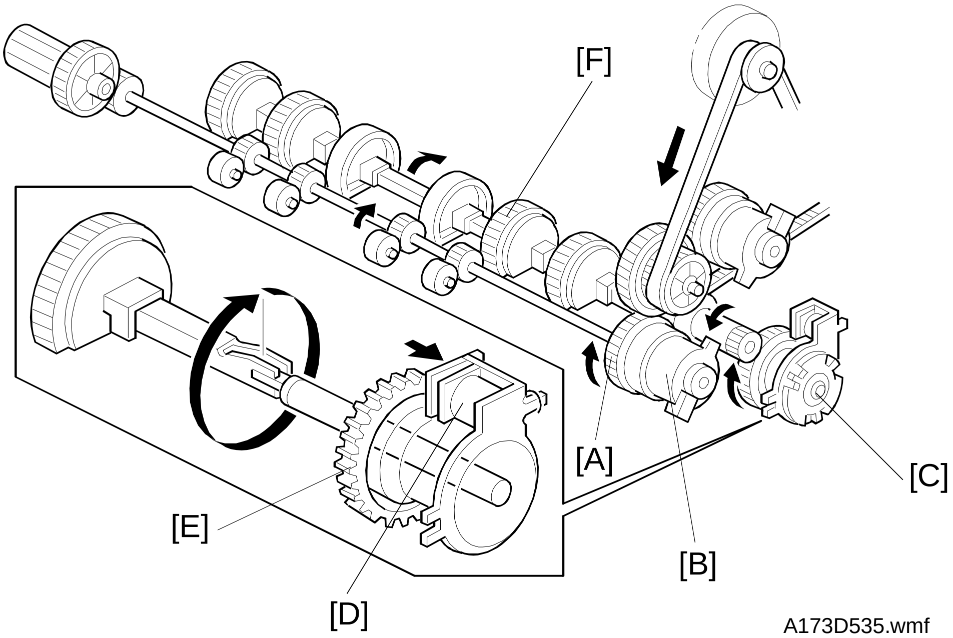
Once the release slider comes off, the bottom plate is raised by the pressure springs [E] and the top sheet pushes up the corner separators [F]. This keeps the stack of paper at the correct height.

10.3.2 Paper End Detection

When the paper tray runs out of paper, the paper end feeler [G] drops through a slot in the tray bottom plate. The paper end actuator [H], which is on the same shaft as the paper end feeler, pivots into the paper end sensor [I]. The paper end sensor sends a HIGH signal to the main board and then the Add Paper indicator turns on. The Wait indicator stays on and the machine stops after the copy cycle is finished.

When the paper tray is pulled out, the release arm [J], which is spring loaded, rotates clockwise and raises the paper end actuator and the paper end feeler. This prevents the paper end feeler from being damaged by the paper tray. When the paper tray is closed, the projection [K] on the paper tray pushes the release arm to release the paper end actuator and the paper end feeler.

10.4 2ND FEED STATION PAPER MECHANISM

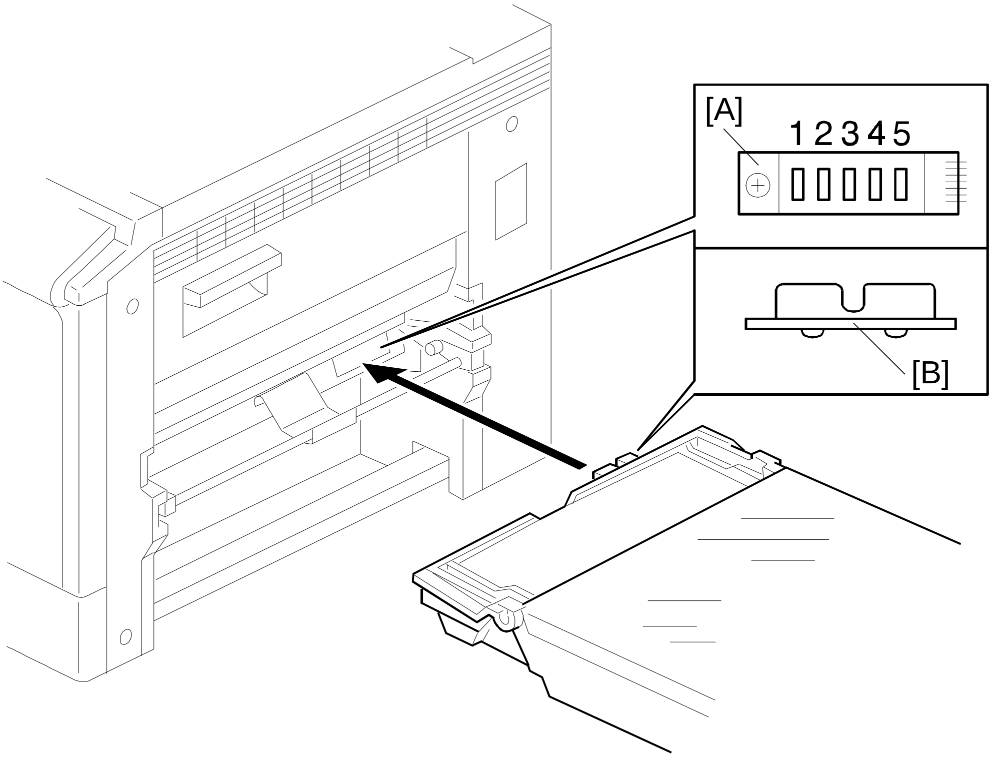


A173D535.wmf

Main motor rotation is transmitted to the relay roller clutch gear [A] through gears and a timing belt. The paper feed timing is controlled by the relay roller clutch [B] and the 2nd feed clutch [C].

Both the relay roller clutch and the 2nd paper feed clutch turn on at the same time to start paper feed. When the 2nd feed clutch is energized, the solenoid [D] releases the stopper of the gear [E] to allow the 2nd feed rollers [F] to turn. The 2nd feed rollers stop turning when they complete one rotation. The relay roller clutch stays energized until the leading edge of the paper reaches the registration rollers.

10.5 PAPER SIZE DETECTION



A173D534.wmf

The 2nd feed station does not have paper size detection. The user must input the paper size. The following description is for the 1st feed station only.

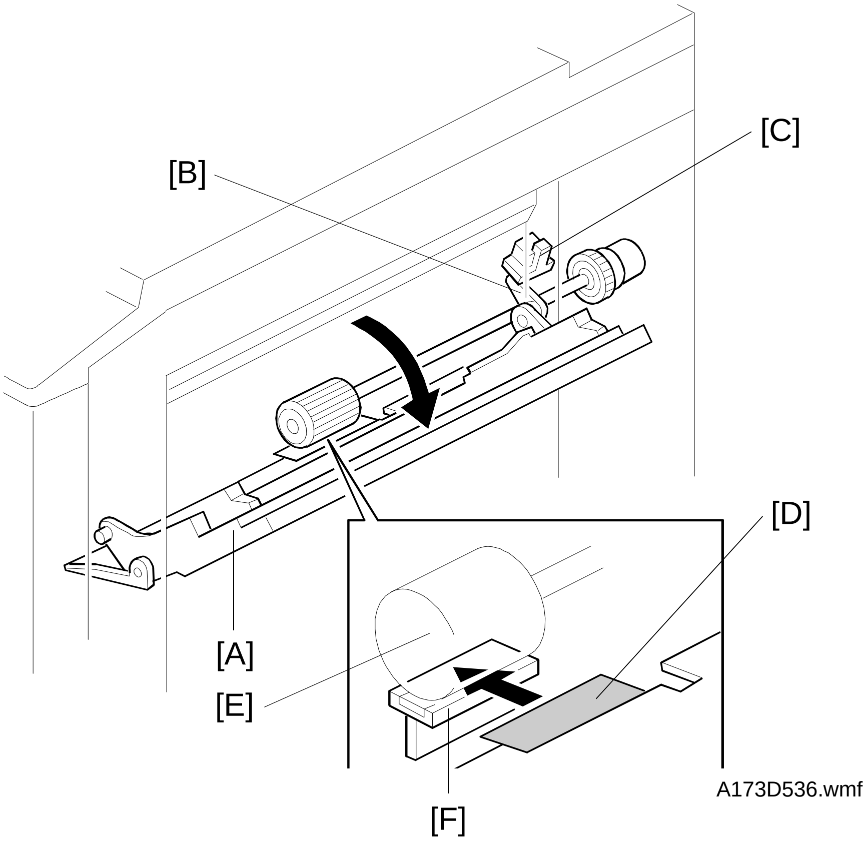
The paper size switch (SW3) [A] in the cassette entrance detects the paper size. The paper size switch has five microswitches (SW3-1 through 3-5) inside. The paper size switch is actuated by an actuator plate [B] on the rear of the cassette. Each paper size has its own unique combination of notches in the plate. The CPU receives a LOW signal from the microswitches activated by the actuator and determines which cassette was inserted.

Paper Size Detection Table (1st Feed Station)

Paper Size	**Switch 3**					**Size Indication**
	1	**2**	**3**	**4**	**5**	
Universal	0	0	0	0	0	❋
A3	1	0	0	0	0	A3 ▭
B4	1	1	0	0	0	B4 ▭
A4 (sideways)	0	0	1	0	0	A4 ▯
A4 (lengthwise)	1	0	1	0	0	A4 ▭
B5 (sideways)	0	1	1	0	0	❋
B5 (lengthwise)	1	1	1	0	0	❋
A5 (sideways)	0	0	0	1	0	A5 ▯
A5 (lengthwise)	1	0	0	1	0	A5 ▭
B6 (sideways)	0	1	0	1	0	❋
B6 (lengthwise)	1	1	0	1	0	❋
F (8" x 13")	1	0	0	1	1	F ▭
Return Post Card	0	0	1	1	0	❋
Post Card	1	0	1	1	0	❋
11" x 17"	0	0	0	0	1	11 x 17 ▭
11" x 8½"	1	0	0	0	1	8½ x 11 ▯
11" x 15"	0	1	0	0	1	❋
10" x 14"	1	1	0	0	1	❋
8½" x 14"	0	0	1	0	1	8½ x 14 ▭
8½" x 13"	1	0	1	0	1	❋
8½" x 11"	0	1	1	0	1	8½ x 11 ▭
8½" x 5½"	1	1	1	0	1	5½ x 8½ ▯
8¼" x 13" (14")	0	0	0	1	1	❋
8" x 10½"	0	1	0	1	1	❋
8" x 10"	1	1	0	1	1	❋
5½" x 8½"	0	0	1	1	1	5½ x 8½ ▭
No Cassette	1	1	1	1	1	—

0: Actuated (Low)
1: Not Actuated (High)

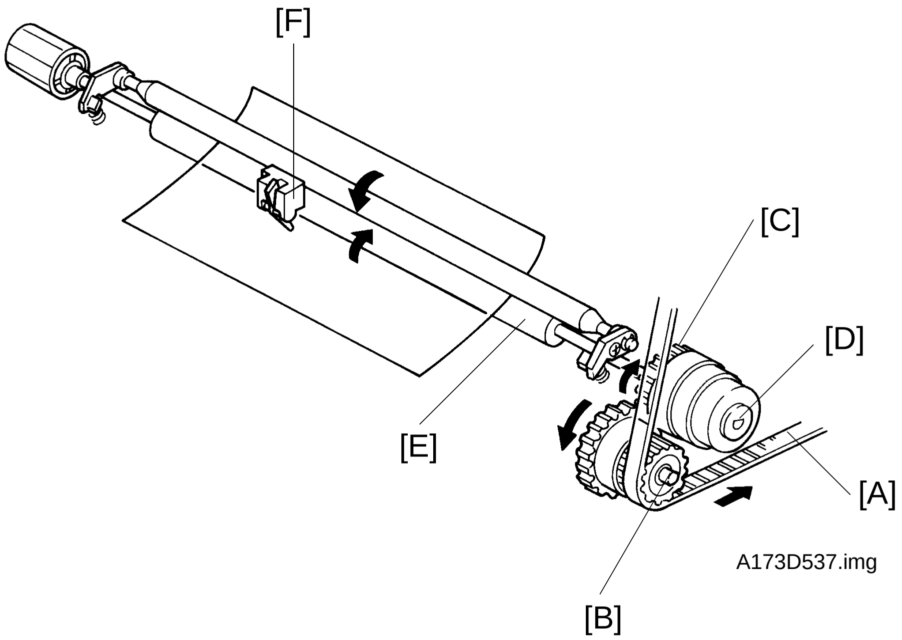
10.6 MANUAL FEED TABLE



The manual feed table [A] uses the same feed mechanism as the 1st feed station. When the manual feed table is opened, the lever [B] actuates the manual feed table switch [C] and the Manual Feed indicator on the operation panel turns on. At the same time, a metal plate [D] is inserted between the paper feed roller [E] and the friction pad [F]. This prevents paper feed from the 1st feed station.

The paper separation mechanism does not function for manual feed, so sheets of paper must be placed one by one on the manual feed table.

10.7 PAPER REGISTRATION



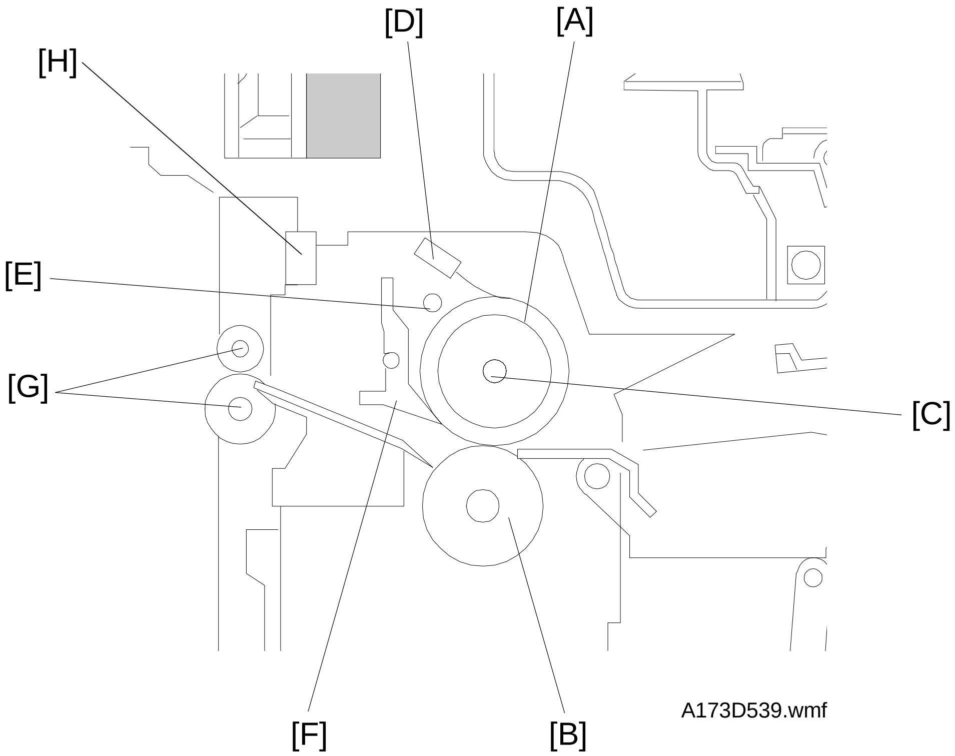
Main motor rotation is transmitted to the timing belt [A] through a series of gears. The timing belt rotates the relay gear [B] and then the registration roller clutch gear [C]. When the registration clutch [D] is energized, the rotation of the clutch gear is transmitted to the lower registration roller [E].

The registration rollers can be rotated by a knob in the front to ease misfed paper removal.

The registration sensor [F], which is positioned just before the registration rollers, controls the paper feed stop timing. The 1st paper feed clutch stays on for 164 milliseconds after the leading edge of the paper actuates the registration sensor. At the end of this period, the CPU turns off the 1st paper feed clutch. This delay allows time for the paper to press against the registration rollers and buckle slightly to correct skew.

11. IMAGE FUSING

11.1 OVERVIEW

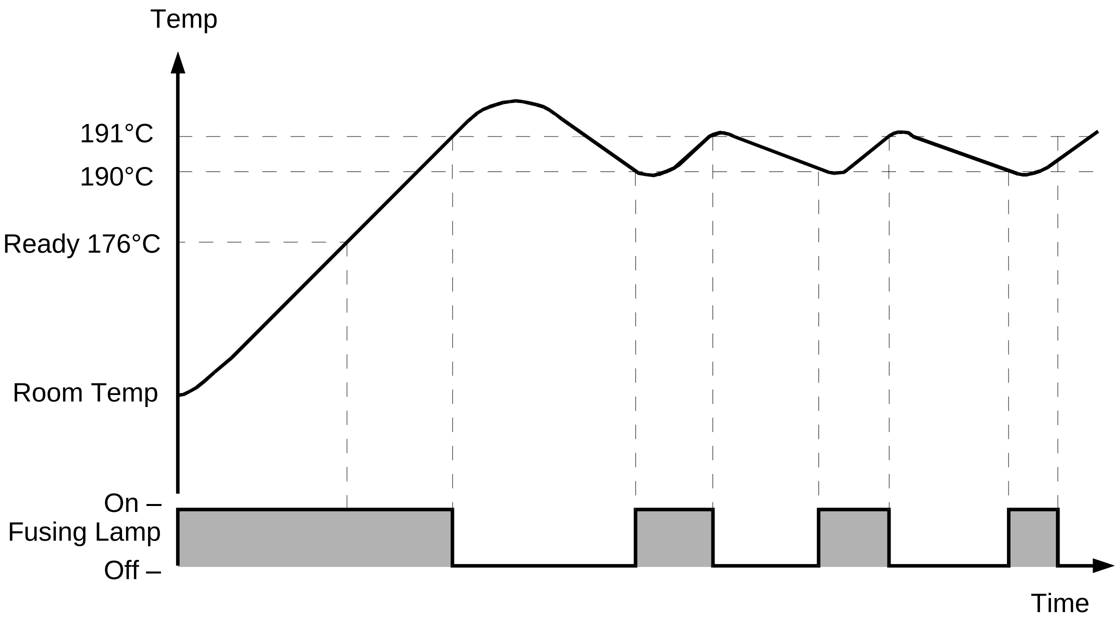


After the image is transferred, the copy paper enters the fusing unit. The image is fused to the copy paper by the process of heat and pressure through the use of a hot roller [A] and pressure roller [B].

The fusing lamp [C] (780W) located inside the hot roller is turned on and off to maintain the operating temperature of 190°C. The CPU monitors the hot roller surface temperature through a thermistor [D] which is in contact with the hot roller's surface. A thermofuse [E] protects the fusing unit from overheating.

The hot roller strippers [F] separate the copy paper from the hot roller and direct it to the exit rollers [G]. The exit sensor [H] monitors the progress of the copy paper through the fusing unit and acts as a misfeed detector while the exit rollers drive the copy paper to the copy tray. When a sorter is installed, the paper sensor on the sorter also functions as a misfeed detector.

11.2 FUSING LAMP CONTROL



A173D540.wmf

When the main switch is turned on, the CPU starts sending a trigger pulse to the fusing control circuit. The fusing control circuit then applies power to the fusing lamp. The power is applied until the CPU detects the ready temperature (176°C) through the fusing thermistor. This should take less than 60 seconds. Once the CPU detects the ready temperature, the CPU changes the timing of the fusing lamp on/off check (checks whether the fusing lamp should be turned on or off) from every 1 second to every 5 seconds.

During warm-up, the thermistor’s temperature lags behind the real hot roller’s temperature. As a result, when the thermistor senses the ready temperature, the hot roller is already at or near the operating temperature. At this time the Ready indicator turns on.

After that, the trigger pulse is turned on constantly when thermistor detects a temperature less than 190°C and is turned off when the thermistor detects 191°C.

If the fusing lamp is turned on or off when the exposure lamp is on, the power supplied to the exposure lamp will fluctuate, possibly degrading the copy image. To prevent this, the fusing lamp does not switch on/off during scanning; it stays either on or off.

11.3 ENERGY SAVER MODE

When the copier is not in use, the energy saver function reduces the power consumption by decreasing the fusing temperature.

When the Energy Saver/Clear Modes key is pressed for over 1 second, the copier goes into the energy saver mode. The Energy Saver indicator turns on and all the other indicators turn off.

The energy saving ratio can be selected using SP86 as shown in the following table.

SP data (SP86)	Energy saving ratio without save energy mode	Fusing temperature	Warm-up time
0	∆ 63%	Approx. 70°C	Approx. 30 s
1	∆ 37%	Approx. 130°C	Approx. 20 s
2	∆ 28%	Approx. 145°C	Approx. 10 s
3	∆ 12%	Approx. 175°C	Approx. 0 s

Factory Setting: SP86 = 2

NOTE: The energy saving ratios in the above table are standard values measured in laboratory tests under controlled conditions. The actual ratios will vary depending on environmental conditions, copy modes, power supply conditions, and measurement instruments.

The greater the energy saving ratio is, the longer the waiting time until the copier returns to the ready condition.

The copier is returned to the ready condition (after a warm-up time) by the following actions:

1. Pressing any key except the Start key.
2. Opening the manual feed table or setting copy paper on it.

When the auto energy saver mode (SP78) is selected, the copier automatically goes into the energy saver mode after the auto reset time selected with SP15.

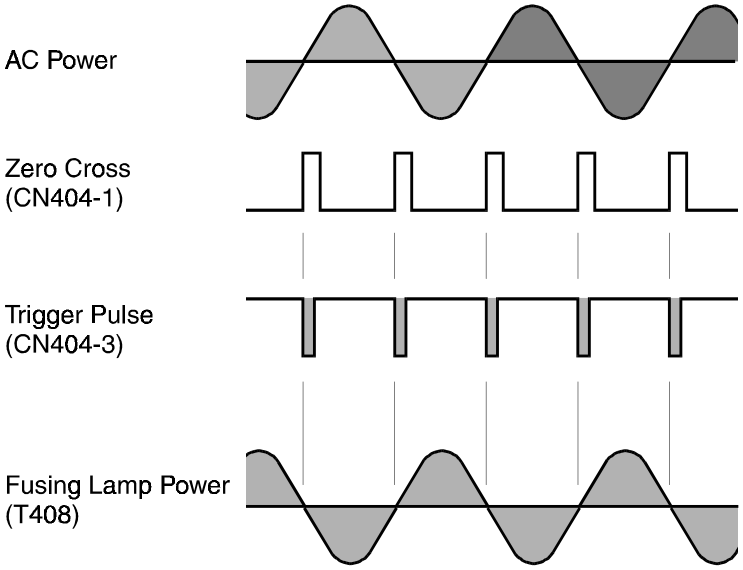
11.4 FUSING LAMP CONTROL CIRCUIT

11.4.1 Overview

The main board monitors the fusing temperature through a thermistor. It also uses the zero cross signal generated by the power supply/ac drive board to accurately control the applied power.

Normally, the voltage applied to the lamp is a full ac waveform. However, through SP29, fusing power can be set to phase control. (Normally, phase control is used only if the customer has a problem with electrical noise or interference.)

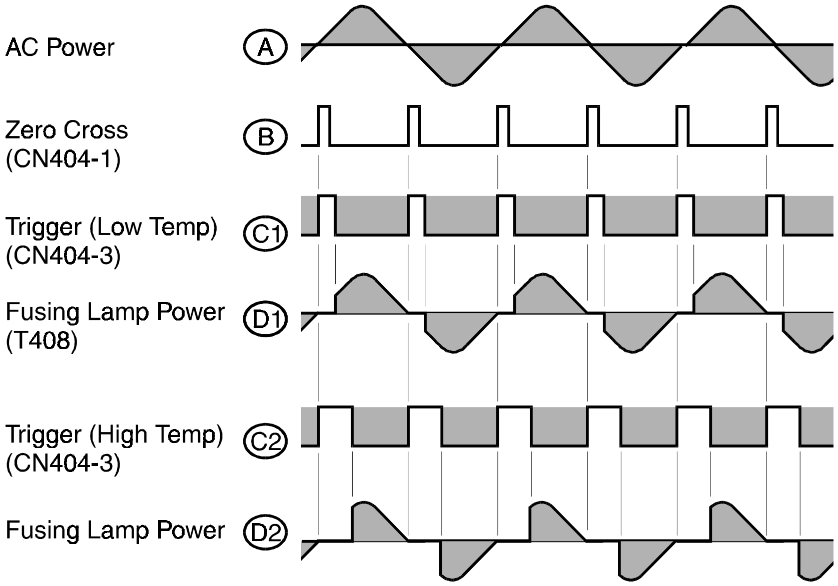
11.4.2 On/Off Control



A173D541.wmf

When the main switch is turned on, the main board starts to output a trigger pulse, which has the same timing as the zero cross signal, to the ac drive board. This trigger pulse allows maximum ac power to be applied to the fusing lamp. When the operating temperature is reached, the CPU stops outputting the trigger pulse (the trigger stays HIGH) and the fusing lamp turns off.

11.4.3 Phase Control Mode


AC Power
A
Zero Cross
(CN404-1)
B
Trigger (Low Temp)
(CN404-3)
C1
Fusing Lamp Power
(T408)
D1
Trigger (High Temp)
(CN404-3)
C2
Fusing Lamp Power
D2

A173D542.wmf

The main board sends the fusing lamp trigger pulse (LOW active) to the ac drive board, which provides ac power to the fusing lamp at the falling edge of each trigger pulse. The trigger pulse goes HIGH when the main board receives the zero cross signal.

The amount of time that power is applied to the fusing lamp depends on the temperature of the hot roller.

The trigger pulse (LOW part) is wider [C1] and power is supplied for longer [D1] when the hot roller temperature is lower. It is narrower [C2] and power is supplied for a shorter time [D2] when the hot roller is near the operating temperature.

11.4.4 Overheat Protection

There is an overheat protection circuit in the main board. If the hot roller temperature reaches 240°C, the resistance of the thermistor (between CN121-7 and CN121-87 becomes too low. If the main board detects this condition, "E-53" lights on the operation panel and the power to the fusing lamp is cut.

Even if the thermistor overheat protection fails, the thermofuse opens when it reaches 167°C, removing power from the fusing lamp.

SECTION 3

INSTALLATION

1. INSTALLATION REQUIREMENTS

1.1 ENVIRONMENT

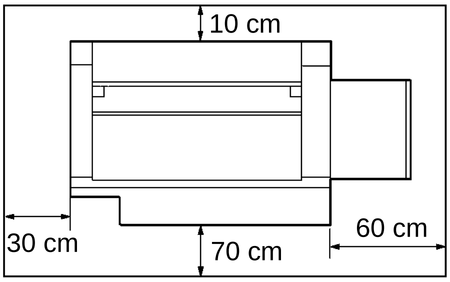
1. Temperature Range: 10°C to 30°C (50°F to 86°F)
2. Humidity Range: 15% to 90% RH
3. Ambient Illumination: Less than 1,500 lux. (Do not expose to direct sunlight.)
4. Ventilation: Room of more than 30 m^3. Room air should turn over at least 30 m^3/hr/person.
5. Ambient Dust: Less than 0.15 mg/m^3 (4×10^{-3} oz/yd^3)
6. The machine must not be subjected to sudden temperature changes. Do not install the machine where it will be directly exposed to cool air from an air conditioner or hot air from a heater.
7. Avoid placing the machine in an area filled with corrosive gas.
8. Do not install at any location over 2,000 meters (6,500 feet) above sea level.
9. Place the machine on a strong and level base.
10. Avoid any area where the machine may be subjected to frequent strong vibrations.

1.2 MACHINE LEVEL

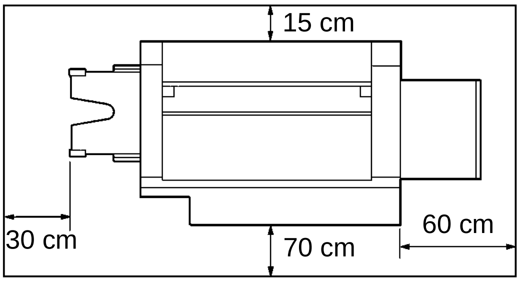
1. Front to back: Within 5 mm (0.2") of level
2. Right to left: Within 5 mm (0.2") of level

Make sure that the machine is level using a carpenter’s level.

1.3 MINIMUM SPACE REQUIREMENTS



A173I500.img



A173I501.img

1. Front : 70 cm (27.6")
2. Back : 10 cm (3.9")
   : 15 cm (6.0") (when the sorter is installed.)
3. Right : 60 cm (31.5")
4. Left : 30 cm (11.8")

NOTE: Make sure there is at least 15 cm (6.0") clearance behind the copier so that the sorter will not be damaged when it is opened.

1.4 POWER REQUIREMENTS

1. Input voltage level:

   110 V/60 Hz: More than 15 A (for Taiwan)
   220, 230, 240 V/50 Hz: More than 6 A (for Asia/Europe)
   220 V/60Hz/6 A (for Middle East)

2. Permissible voltage fluctuation: ±10%
3. Do not set anything on the power cord.

NOTE: a) Be sure to ground the machine. (Do not connect the grounding wire to a gas pipe.)
b) Make sure the plug is firmly inserted in the outlet.
c) Avoid multiwiring.

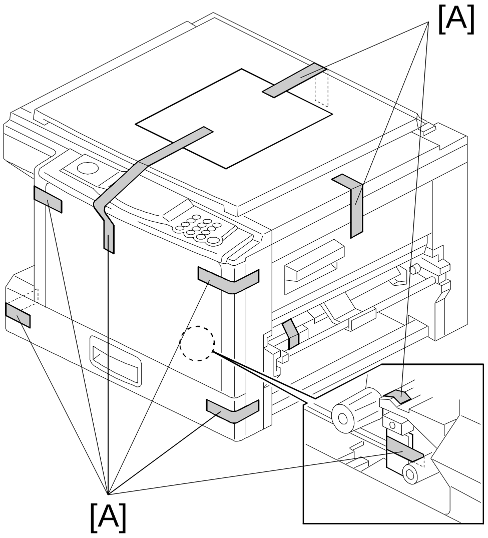
2. INSTALLATION PROCEDURE

2.1 ACCESSORY CHECK

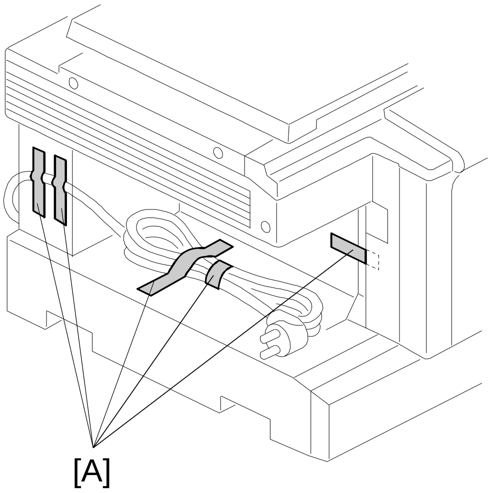
Check the quantity and condition of the accessories in the box according to the following list:

1. Receiving Tray	1 pc
2. Cassette - Small	1 pc
3. Paper Size Decal	1 pc
4. Paper Size Actuator	1 set
5. Decal - Symbol Explanation	1 pc
6. Operating Instructions (Except Europe)	1 pc
7. New Equipment Condition Report (Ricoh only)	1 pc
8. Model Name Plate (OEM only)	1 set
9. Decal - Key Top Cover (OEM only)	1 set
10. Operation Panel Sheet (Taiwan version only)	3 pcs
11. Decal - Changing Paper Size (Taiwan version only)	1 pc

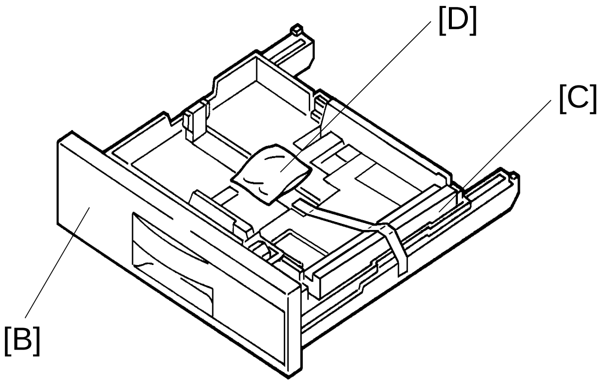
2.2 COPIER INSTALLATION



A173I502.wmf

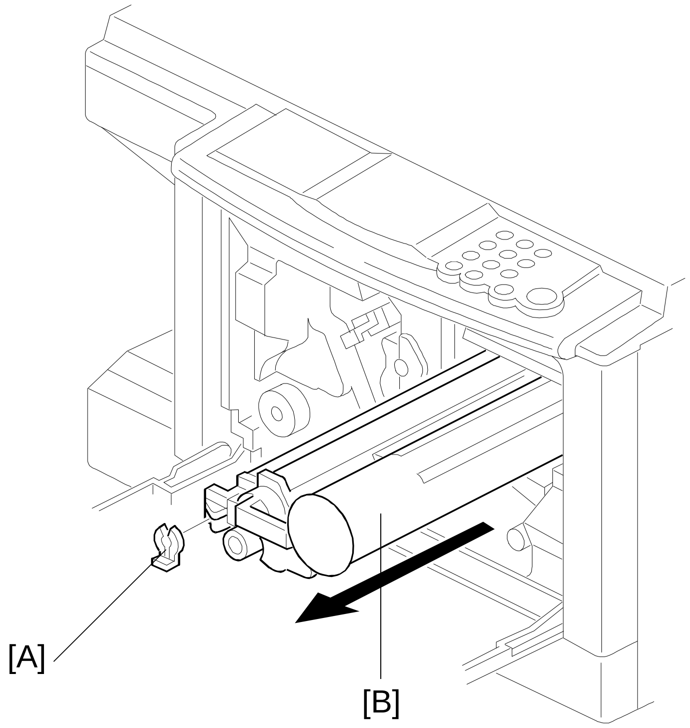


A173I504.wmf



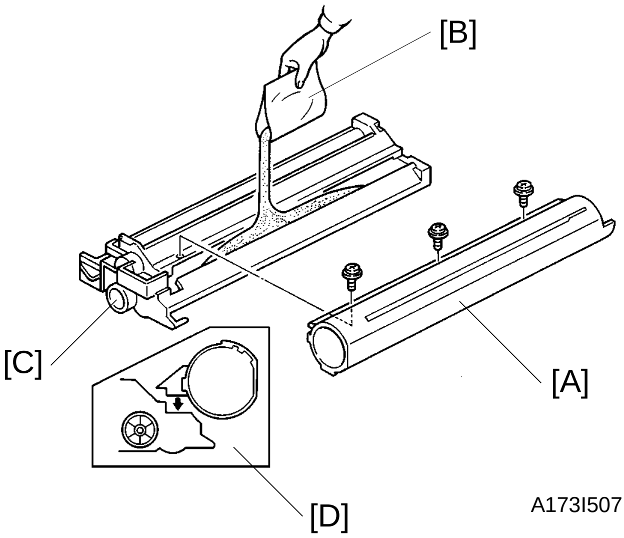
A173I503.img

1. Remove the strips of tape [A] from the copier at the locations shown.
2. Pull out the paper tray [B] and remove the foam block [C], tape, and silica gel [D].

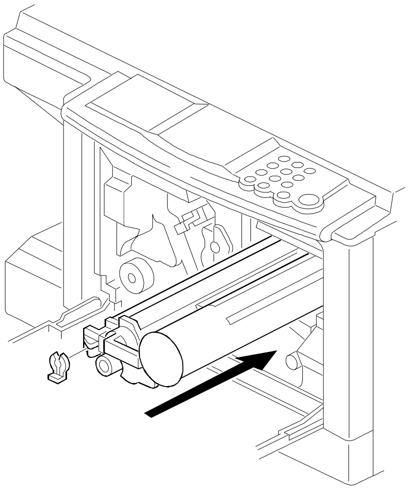


A173I505.wmf

3. Remove the snap ring [A] and pull out the development unit [B]. Place it on a clean sheet of paper.



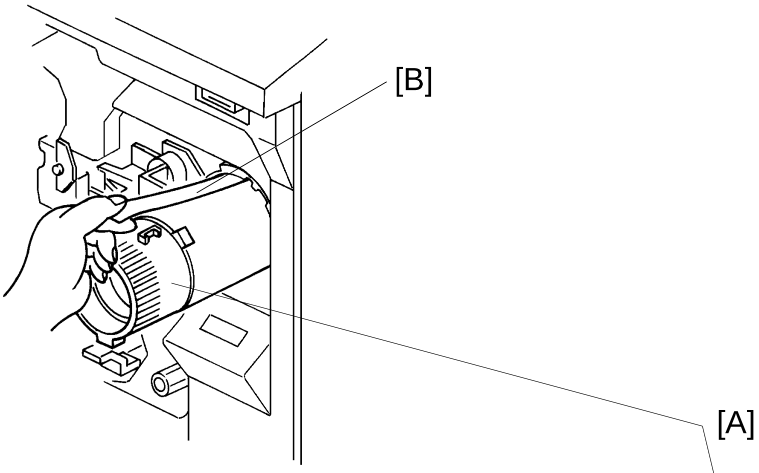
A173I507.img



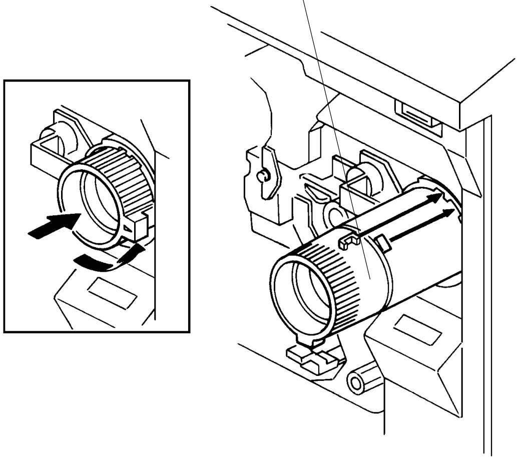
A173I506.wmf

4. Remove the toner supply unit [A] from the development unit (3 screws).
5. Pour one pack of developer [B] into the development unit while turning the development roller knob [C] counterclockwise to distribute the developer.
6. Reinstall the toner supply unit on the development unit.

   NOTE: Make sure that there is no gap [D] between the toner supply unit and the development unit.
7. Reinstall the development unit and the snap ring.



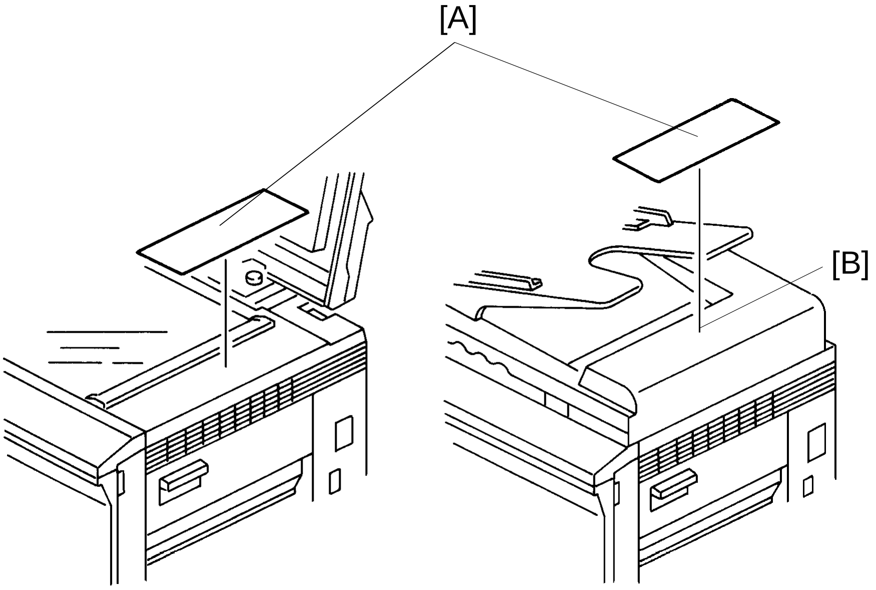
A173I509.img



A173I510.img

8. Shake a toner cartridge [A] well and insert the cartridge while pulling off the seal [B]. Then, install the cartridge as shown.

9. Close the front cover.



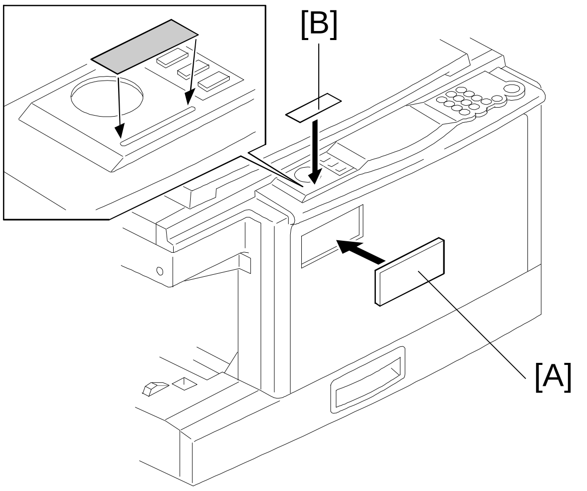
A173I511.img

10. Perform the developer initial setting procedure.
    1) Access SP mode.
        1. Press the ◈/◎ key
        2. Press the Number key in the following order:
           1 → 0 → 7
        3. Press the C/⊛ key and hold it for more than 3 seconds.
    2) Perform SP65 in the following sequence.

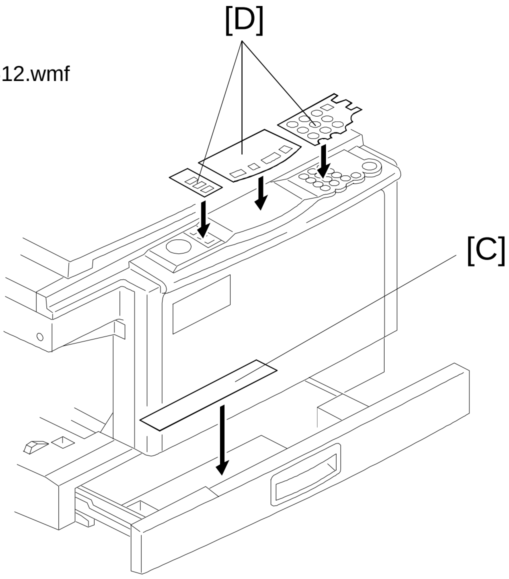
SP Mode Number		Procedure
65	Developer Initial Setting	Enter "65" using the numeral keys and press the Enter key. "50" will be displayed in the copy counter. Press the Start key to start initial setting procedure.

11. Place the outer decal (symbol explanation) [A] on the upper cover and install the receiving tray.

    NOTE: If a DF is installed on the machine, place the outer decal [A] on the DF [B] as shown.



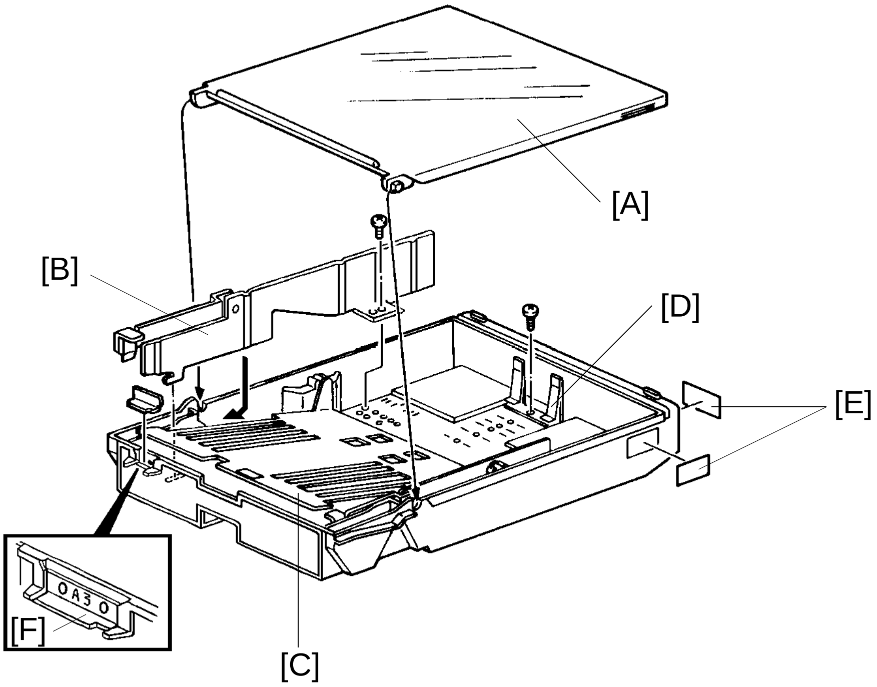
A173I512.wmf



A173I513.wmf

12. Attach the model name plate [A] and key top cover decal [B] as shown in the illustration (OEM machines only).
13. Attach the changing paper size decal [C], and install the operation panel sheets [D] (Taiwan version machines only).
14. Load paper into the cassette and/or paper trays.
15. Input the paper size setting as described on the instruction decal [C].
16. Check the machine operation and copy quality.

2.3 CASSETTE MODIFICATION

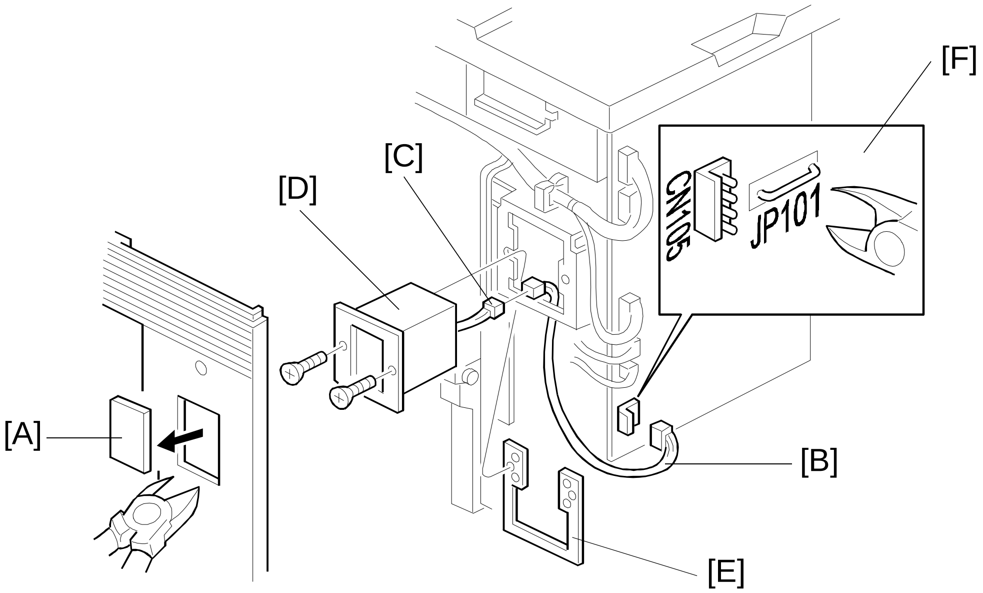


A173I514.img

1. Take off the cassette cover [A].
2. Remove the side fences [B] (1 screw each) and the bottom plate [C].
3. Reposition the rear fence [D] in the desired paper size position (1 screw).

   NOTE: Paper size positions are shown on the inside of the cassette.
4. Reinstall the bottom plate.
5. Reinstall the side fences in the desired size positions.
6. Attach the proper paper size decals [E] on the cassette at the positions shown.
7. Insert the actuator plate [F] in the slot on the front of the cassette as shown.

2.4 KEY COUNTER HOLDER INSTALLATION (Option)



A173I517.wmf

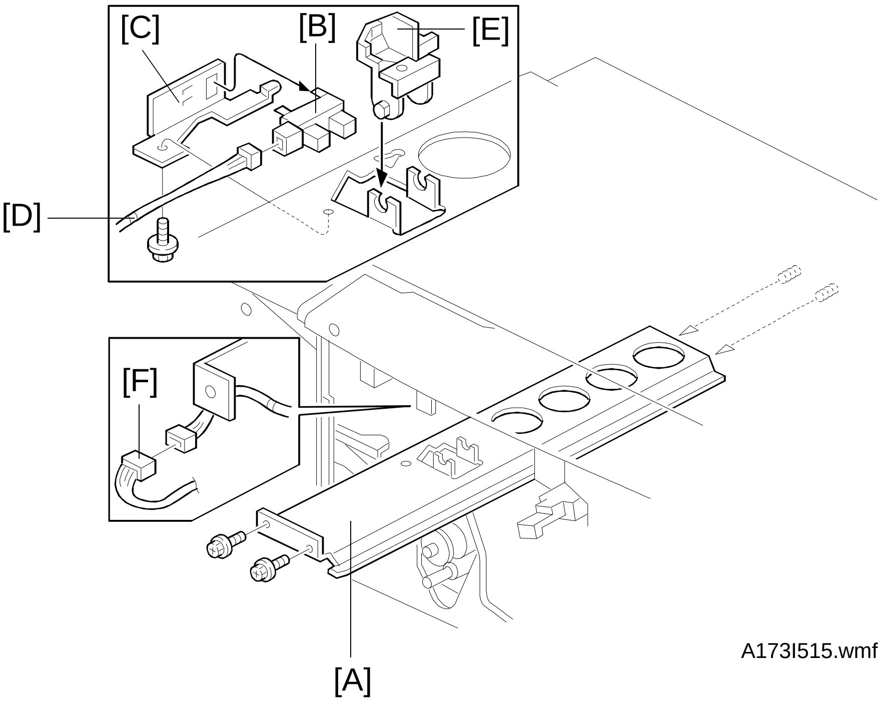
NOTE: To install the key counter holder, the following parts are required:

Key Counter Bracket (54261515)
Key Counter Harness (A0775312)
Two M3x6 Sunken Head Screws (03230060W)

1. Unplug the power cord.
2. Remove the right cover (4 screws) and rear cover (4 screws).
3. Cut off the key counter cover [A] on the right cover with a pair of pliers.
4. Connect the key counter harness [B] to CN105 on the main board.
5. Connect the 4 pin connector [C] of the key counter holder [D] to the key counter harness through the cutout in the frame.
6. Position the key counter bracket [E] as shown in the illustration and insert the key counter holder.
7. Align the holes in the key counter bracket with the mounting holes in the key counter holder. Secure the key counter holder (2 screws).

   NOTE: The key counter bracket has three different hole sizes. Use the holes which match those on the counter.
8. Cut the jumper wire (JP101) using a pair of pliers [F].
9. Reinstall all the covers.

2.5 TONER OVERFLOW SENSOR INSTALLATION (Option)

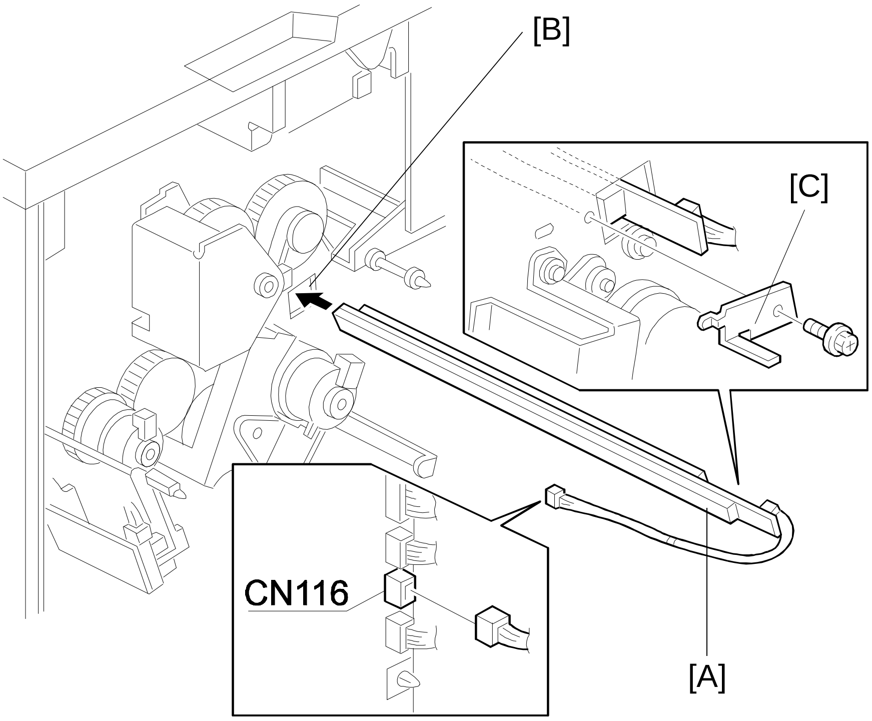


The following parts are necessary to install the toner overflow sensor:

AW020075: Photointerrupter
A0063676: Sensor Shutter
A0483596: Sensor Bracket
A0485310: Harness - Overflow
03130060W: Philips Pan Head Screw - M3x6

1. Unplug the power cord.
2. Remove the front door and the inner cover (seven screws).
3. Remove the guide plate [A] (2 screws).
4. Set the photointerrupter [B] on the bracket [C]. Connect the overflow harness [D] to the photointerrupter.
5. Install the bracket [C] (1 screw) on the guide plate [A]. Then set the sensor shutter [E].
6. Reinstall the guide plate (2 screws).
7. Connect the harness to the connector [F] of the copier.
8. Reinstall the inner cover and the front door.
9. Change the SP115 setting from 0 to 1.

2.6 PRE-TRANSFER LAMP (PTL) INSTALLATION (Option)



A173I516.wmf

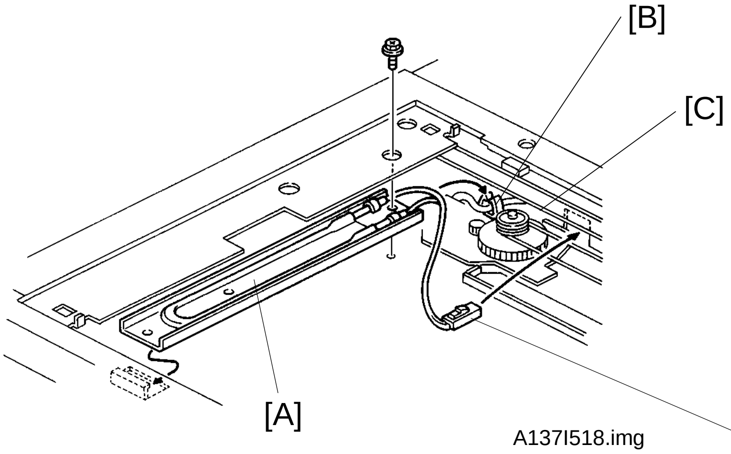
NOTE: If the machine is used in extremely high temperature and high humidity conditions, the image density of halftone areas will be lighter, or the trailing edge of the copy might not be printed completely. If this problem occurs, install the optional PTL.

The following parts are necessary to install the pre-transfer lamp:

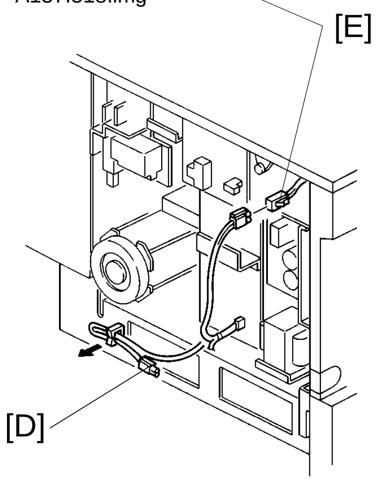
A0485226: Pre-transfer Lamp
A0482065: PTL Support Plate
04430060W: Hexagon Head Tapping Screw - M3x6

1. Remove the rear cover (4 screws).
2. Slide the pre-transfer lamp [A] through the cutout [B] in the rear frame.
3. Install the PTL support plate [C] (1 screw) to hold the pre-transfer lamp.
4. Connect the PTL connector to CN116 of the main board.
5. Reinstall the rear cover.

2.7 OPTICS ANTI-CONDENSATION HEATER INSTALLATION (Option)



A137I518.img



A173I519.img

1. Make sure that the main switch is turned off.

2. Remove the rear cover.

3. Remove the exposure glass. (See Exposure Glass Removal.)

4. Move the 1st and 2nd scanner unit all the way to the right.

5. Install the optics heater [A] in the optics cavity as shown (1 screw: 04430060W).
   - Anti-condensation Heater - 115 V: AX400052
   - Anti-condensation Heater - 230 V: AX400053

6. Mount the anti-condensation heater harness in the following way.
   - Harness clamp [B].
   - Rear frame cutout hole [C].

7. Rewire the heater harness [D] as shown in the illustration and connect it to the anti-condensation heater connector [E].

SECTION 4

SERVICE TABLES

1. SERVICE REMARKS

1.1 GENERAL CAUTION

1. If the Start key is pressed before the copier finishes the warm-up cycle, the Ready indicator starts blinking and the copier starts making copies as soon as the warm-up cycle is completed.
2. Even if the main switch is turned off, ac power is applied to the power supply/ac drive board to drive the anti-condensation heater. Unplug the power cord before accessing this board.

1.2 DRUM AND DRUM UNIT

The organic photoconductor drum is comparatively more sensitive to light and ammonia gas than a selenium drum.

1. Never expose the drum to direct sunlight.
2. Never expose the drum to direct light of more than 1,000 Lux for more than a minute.
3. Never touch the drum surface with bare hands. When the drum surface is touched with a finger or becomes dirty, wipe with a dry cloth or clean with wet cotton. Wipe with a dry cloth after cleaning with wet cotton.
4. Never use alcohol to clean the drum; alcohol dissolves the drum surface.
5. Store the drum in a cool, dry place away from heat.
6. Take care not to scratch the drum as the drum layer is thin and is easily damaged.
7. Never expose the drum to corrosive gases such as ammonia gas.
8. Always keep the drum in the protective sheet when inserting or pulling the drum unit out of the copier to avoid exposing it to bright light or direct sunlight. This will protect the drum from light fatigue.
9. Before pulling out the drum unit, place a sheet of paper under the drum to catch any spilled toner.
10. Drum initial setting (SP66) must be performed when a new drum is installed.

    NOTE: This is not necessary at installation of a new machine as the drum initial setting is performed at the factory.
11. Dispose of used drums in accordance with local regulations.

12. Never loosen the two screws securing the drum support plate. The position of the drum support plate is set with a special tool at the factory to ensure the proper gap between the drum and the development roller.

1.3 CHARGE CORONA

1. Clean the corona wire by sliding the corona unit in and out. (The cleaner pads come into contact with the corona wire when the corona unit has been slid all the way out.) The wire and casing can also be cleaned with water or dry cloth. Do not use sandpaper or solvent.
2. Do not touch the corona wire with oily hands. Oil stains may cause white bands on copies.
3. Make sure that the corona wire is correctly positioned between the cleaner pads and that there is no foreign material (iron filings, etc.) on the casing.
4. When installing a new corona wire, be sure to place the damper ring in the front end block. (See Charge Corona Wire Replacement.)
5. When adjusting the charge corona current, always make sure that the center of the drum shoe is aligned with the corona wire.
6. Clean the charge grid with a blower brush (not with a cloth).
7. The corona height should only be adjusted in the following two cases:
   a) When the front end block is replaced
   b) When the drum charge current is uneven

1.4 OPTICS

1. The positions of the following parts are very difficult to adjust, so do not adjust them.
   a) 4th/5th Mirror Home Position Sensor
   b) Lens Home Position Sensor
   c) Lens and 4th/5th Mirror Guide Rails

   NOTE: Before removing a sensor bracket to replace a sensor, mark the position of the bracket. Check the copy image (magnification and focus) to determine the exact location of the sensor.

2. When installing the exposure glass, make sure that the red mark on the edge of the glass faces up. This side has received a special treatment to make it smoother and to generate less static electricity. This is especially important when the DF is installed.
3. Clean the following parts with a dry cloth:
   a) Lens and 4th/5th Mirror Guide Rails
   b) Scanner Guide Plates
4. Clean the exposure glass with glass cleaner and a dry cloth to reduce the amount of static electricity on the glass surface.
5. Only use a clean soft cloth damped with alcohol or water to clean the mirrors and lens.
6. Do not touch the following parts with bare hands:
   a) Reflectors
   b) Exposure Lamp
   c) Mirrors and Lens
7. After adjusting the light intensity (SP48), adjust the ADS reference voltage (SP56).

1.5 DEVELOPMENT UNIT

1. Be careful not to nick or scratch the development roller sleeve.
2. Place the development unit on a sheet of paper after removing it from the copier. This prevents any small metal objects (staples, clips, E-rings, etc.) from being attracted to the development roller and getting inside the unit.
3. Be careful not to bend the bias terminals.
4. Never loosen the two screws securing the bias terminal block. The position of the terminal block is set with a special tool at the factory to ensure the proper gap between the drum and the development roller.
5. Never loosen the four screws securing the doctor plate. The position of the doctor plate is set with a special tool at the factory to ensure the proper gap between the doctor blade and the development roller.
6. Clean the drive gears after removing used developer.
7. Developer initial setting is necessary when the developer is replaced (SP65).
8. Dispose of used developer in accordance with local regulations.

1.6 TONER SUPPLY

1. Clean the image density sensor with a blower brush.
2. The ID sensor adjustment (Vsg Adjustment [SP54]) is required in the following cases:
    a) When the ID sensor is replaced
    b) When the main board is replaced
    c) When the drum has been replaced and Vsg is out of specification
    d) When there have been problems with toner supply and Vsg is out of specification

1.7 TRANSFER AND SEPARATION

1. Clean the corona wires and casing with water or a dry cloth.
2. When adjusting the corona current, always make sure that the center of the drum shoe is aligned with the corona wire.

1.8 CLEANING UNIT

1. When servicing the cleaning unit, be careful not to damage the edge of the cleaning blade.
2. Before pulling out the cleaning unit, place a sheet of paper under it to catch any spilled toner.
3. When inserting the cleaning unit into the copier, be sure the cleaning unit rail is properly engaged with the unit guide rail on the copier.
4. Empty the used toner tank every service call.
5. Dispose of used toner in accordance with local regulations.
6. After disposing of used toner, reset the used toner counter (SP83).

1.9 FUSING UNIT

1. Be careful not to damage the edges of the hot roller strippers or their tension springs.
2. Do not touch the fusing lamp with bare hands.
3. Make sure that the fusing lamp does not touch the inner surface of the hot roller.

1.10 PAPER FEED

1. Do not touch the paper feed rollers with oily hands.
2. Non-standard size copy paper may stick to the cassette side or back fences and misfeed. Reposition the fences.
   Example:
   With an A4/11" x 8 1/2" (sideways) cassette, the proper paper width is 296 mm. 297.5 mm width paper sticks to the cassette fences and does not feed correctly.
3. The side fences and the end fence of the paper tray should be positioned correctly so that they securely hold the paper. Otherwise, paper misfeeds may occur.
4. A worn out registration roller causes paper to crease. It should be replaced.

1.11 DOCUMENT FEEDER

1. Do not bend the DF interface harness at a sharp angle. This damages the fiber optics cables.
2. When installing or reinstalling the document feeder, make sure that the document feeder is in the open position.
3. A build-up of static electricity on the exposure glass can cause originals to misfeed. Apply silicone oil to the glass to reduce the amount of friction.

1.12 SORTER

1. The sorter has two types of bins, odd numbered and even numbered, which are installed in an alternating sequence. Be sure to install them in the correct order.
2. If the bins do not operate smoothly, lubricate the slot liners and transfer wheels using grease 501 or an equivalent type.

1.13 OTHERS

1. When replacing the main board, remove the RAM pack from the old main board and place it on the new main board. Then, install the new main board in the copier.
2. After installing the new main board with the new RAM pack, the "Clear All Memory (SP99)" procedure (see pages 4-10 and 11) must be performed. (Do not perform SP99 if you have placed the old RAM on the new main board.)
3. Never perform SP99 (Clear All Memory) except for the following two cases:
   a) When the copier malfunctions due to a damaged RAM pack
   b) After replacing the RAM pack
4. Whenever SP99 (Clear All Memory) is performed, all the steps of the "Clear All Memory (SP99)" procedure must be followed. Otherwise, copy quality might be seriously affected.
5. When replacing a sensor, do not overtighten the screws. This may damage the sensor.
6. If a customer claims that red image areas on the original do not appear on the copy, instruct the customer to select a different image density with the Manual Image Density key.
7. Tighten securely the screws used for grounding the following PCBs when reinstalling them.

   - Main Board
   - TC/SC Power Pack
   - CC/Grid/Bias Power Pack
   - AC/DC Power Supply Board

2. SERVICE PROGRAM MODE

2.1 SERVICE PROGRAM MODE OPERATION

The service program (SP) mode is used to check electrical data and change modes or adjustment values.

2.1.1 Service Program Access Procedure

There are two ways to access an SP mode.

1) Access Procedure 1 (for customers and sales representatives)
2) Access Procedure 2 (for service representatives)

Access Procedure 1 (for customers and sales representatives)

Accessible SP modes: SP2, SP3, SP4, SP13, SP14, SP15, SP16, SP17, SP18, SP19, SP21, SP22, SP23, SP26, SP33, SP53, SP78, SP86, SP91, SP92, SP93
(Refer to the service program mode table for details.)

1. Turn on the main switch.
2. Press the [◇/♨] .
3. Press the [C/⊽] key and hold it for more than 3 seconds.
4. Enter the desired SP mode number using the number keys.

   NOTE: To cancel an SP mode number after entering it, press the [C/⊽] key.

5. Press the [R/#] key.

   NOTE: To enter a different SP mode number, press the [C/⊽] key and follow steps 4 and 5.

6. To leave SP mode, press the [◇/♨] key twice.

Access Procedure 2 for service representatives

Accessible SP modes: All SP modes except for SP98 and SP99

1. Turn on the main switch.
2. Press the ◈/◎ key.
3. Press the following keys:
   1 → 0 → 7
4. Press the C/◎ key and hold it for more than 3 seconds.
5. Enter the desired SP mode number using the number keys.

   NOTE: a) To cancel an SP mode number after entering it, press the C/◎ key.
   b) "." is displayed instead of "1" in the Copy Counter when SP mode numbers over "100" are entered. The maximum number is "131".

6. Press the R/# key while holding down the "0" key to view the current value.

   NOTE: To enter a different SP mode number, press the C/◎ key and follow steps 5 and 6.

7. To leave SP mode, press the ◈/◎ key three times.

2.1.2 Change Adjustment Values or Modes

1. Follow Access Procedure 1 or 2.
2. The current value/mode setting will be displayed in the Magnification indicator.
3. Enter the desired value or mode using the number keys and then press the R/# key.
4. To leave SP mode, press the C/♨ key three times.

2.1.3 Memory Reset Procedures

– Clear Counters (SP98) –

NOTE: This SP mode clears the following counters:
- SP88: PM Counter Display
- SP91: User Code Counter Display
- SP100: 1st Feed Station Copies
- SP101: 2nd Feed Station Copies
- SP106: DF Originals
- SP120: Total Service Calls
- SP121: Optics Section Service Calls
- SP122: Exposure Lamp Service Calls
- SP124: Fusing Section Service Calls
- SP125: Duplex Unit Service Calls
- SP130: Total Misfeeds
- SP131: Number of Misfeeds by Location
- User Programs

1. Turn off the main switch.
2. Turn on DPS101-3 and 4 on the main board and turn on the main switch.
3. Enter "98" using the number keys and press the R/# key.
4. Enter "1" using the number keys and press the R/# key.

   NOTE: "1" blinks 4 times when the above procedure is completed.
5. Turn off the main switch.
6. Turn off DPS101-3 and 4.
7. Turn on the main switch to resume normal copier operation.

– Clear All Memory (SP99) –

⚠ CAUTION

Memory all clear mode (SP99) clears all the correction data for copy process control and software counters, and returns all the modes and adjustments to the default settings.
Normally, this SP mode should not be performed. This procedure is required only when the copier malfunctions due to a damaged RAM pack or after replacing the RAM pack.

1. Turn off the main switch.
2. Turn on DPS101-3 and 4 on the main board and turn on the main switch.
3. Enter "99" using the number keys and then press the R/# key.
4. Enter "1" using the number keys and press the R/# key.

   NOTE: "1" blinks 5 times when the above procedure is completed.
5. Turn off the main switch and DPS101-3 and 4.
6. Replace the developer .

⚠ CAUTION

Since the toner density level data (SP64) and the developer counter (no SP mode display) for the Vd correction have been cleared, the old developer cannot be used. If the old developer is used after all the memory is cleared, dirty background, toner scattering, or light copies may occur.

7. Clean the optics, sensors, and the inside of the copier.
8. Turn on the main switch.

9. Refer to the "SP MODE FACTORY SETTING DATA" sheet located in the front door and enter the data into the following SP modes:
   (1) SP40: Trailing Edge Erase Margin Adjustment
   (2) SP41: Lead Edge Erase Margin Adjustment
   (3) SP42: Registration Adjustment
   (4) SP43: Vertical Magnification Adjustment
   (5) SP44: Horizontal Magnification Adjustment
   (6) SP47: Focus Adjustment
   (7) SP48: Lamp Voltage Adjustment
   (8) SP60: Standard Image Density Grid Voltage
   (9) SP62: Standard ID Sensor Grid Voltage

10. Perform the following SP modes in sequence:
    (1) SP66: Drum Initial Setting
    (2) SP65: Developer Initial Setting
    (3) SP54: Vsg Adjustment
    (4) SP48: Light Intensity Adjustment
    (5) SP56: ADS Reference Voltage Adjustment

11. Check the copy quality and perform any necessary adjustments.

2.2 SERVICE PROGRAM MODE TABLE

1. A "❐" after the mode name means that copies can be made in SP mode.
   1) After the following SP mode numbers are entered, the copier goes automatically into copy mode when the R/# key is pressed while holding down the "0" key.
      SP mode numbers: SP5, SP6, SP52, SP55, and SP59
   2) After the following SP mode numbers are entered and the R/# key is pressed while holding down the "0" key, enter the desired value with the number keys. The copier goes automatically into copy mode when the R/# key is pressed.
      SP mode numbers: SP8, SP37, SP40, SP41, SP42, SP43, SP44, SP45, SP46, SP47, and SP48

   To make copies, enter the desired copy quantity, select the ID level and paper feed station, and then press the Start key.

2. A "°" before the mode number means that the mode can be accessed by customers and sales representatives.

3. In the *Function* column, comments (extra information) are in italics.

4. In the *Settings* column, the default value is printed in bold letters.

Mode No.		Function	Settings
1	Paper Type Setting (for DF)	Informs the DF of the type of paper used.	**0: mm** 1: inch
°2	Fixed Magnification Setting	Specifies the magnification ratios selected when the enlarge/reduce key is pressed. 0: 65%, 71%, 77%, 82%, 87%, 93%, 115%, 122%, 129%, 141%, 155% 1: 71%, 82%, 87%, 93%, 115%, 122%, 141% 2: 65%, 74%, 93%, 122%, 129%, 155%	**0: mm and inch** 1: mm version 2: inch version
°3	User Reproduction Ratio (Reduction)	Sets an optional reproduction ratio that can be selected by the Reduce key.	
		61 to 99 can be selected. If "1 is selected with SP12, 50 to 99 can be selected. ***To cancel the setting, input "0" and press the R/# key.***	

Mode No.		Function	Settings
°4	User Reproduction Ratio (Enlargement)	Sets an optional reproduction ratio that can be selected by the Enlarge key ***101 to 156 can be selected. If "1 is selected with SP12, 101 to 200 can be selected.*** ***To cancel the setting, input "0" and press the R/# key.***	
5	Exposure Lamp OFF ❐	Executes a free run with exposure lamp off. *Press the R/# key after selecting "5". Then, press the Start key to start free run. The free run stops when the C/⊙ key is pressed. To cancel this mode, press the R/# key when the machine is the stand-by condition. To save toner, remove the development unit.*	
6	Misfeed Detection Off ❐	Copies are made without misfeed detection. *Press the R/# key after selecting "6" to enter this mode. Copies are made without misfeed detection. To cancel this mode, press the Recall/Enter key when the machine is the stand-by condition.*	
8	Input Check ❐	Displays the input data from sensors and switches.	For details, see page 4-24 and 25.
9	Output Check	Electrical components turn on.	For details, see page 4-26 and 27.
11	All Indicators ON	Turns on all the indicators on the operation panel. *To turn off the indicators, press the R/# key.*	
12	Zoom Range	Select the range of enlargement and reduction. If 1 is selected with this mode, low image density or uneven copy density might occur outside the range of 61 ~ 156%.	**0: 61 ~ 156%** 1: 50 ~ 200%

Mode No.		Function	Settings
°13	Side Edge Erase in Erase Edge Mode	Selects the width of the side erase margin in Erase Edge mode (Program key + "7" + R/# key) or Erase Center and Edge mode (Program key + "8" + R/# key).	**0: Normal** 1: Narrower
		0: 13.5 mm (B4, B5, 10" x 14") *13 mm (A3, A4, *)* *12 mm (8½" x 14", 8½" x 13", 8½" x 11", 8½" x 5½")* *11 mm (A4R, A5, 8" x 13", 8" x 10½", 8" x 10", 11" x 17", 11" x 8½", 11" x 15")* *10 mm (B5R, B6)* *1: 7.5 mm (B4, B5, 10" x 14")* *6 mm (8½" x 14", 8½" x 13", 8½" x 11", 8½" x 5½", A4R, A5, 8" x 13", 8" x 10½", 8" x 10")* *5.5 mm (A3, A4, *)* *5 mm (B5R, B6)* *3.5 mm (11" x 17", 11" x 8½", 11" x 15")*	
°14	Toner Saver Priority	Specifies whether the Toner Saver mode is selected when the main switch is turned on.	**0: No** 1: Toner Saver
°15	Auto Reset Time	Selects auto reset time of 1 or 3 minutes, or cancels this mode.	**0: 1 min.** 1: 3 min. 2: None
°16	Count Up/Down for Copy Count Display	Selects count up or count down.	**0: Up** 1: Down
°17	Auto Feed Station Shift	Selects or deselect auto feed station shift mode.	**0: Auto Shift** 1: Manual
		The copier automatically shifts to the paper feed station holding same size paper when paper runs out. If "manual" is selected, copying stops if the other station does not have the same paper size.	
°18	Lead and Trail Edge Erase in Erase Edge Mode	Selects the width of the lead and trail edge erase margins in Erase Edge mode (Program key + "7" + R/# key) or Erase Center and Edge mode (Program key + "8" + R/# key).	**0: 10 mm** 1: 5 mm 2: 15 mm 3: 20 mm
°19	ADS Priority	Specifies whether the copier defaults to ADS or manual mode when the main switch is turned on.	**0: ADS** 1: Manual
°21	APS Priority (ADF)	Specifies whether the copier defaults to APS or manual mode when an original is set on the DF.	**0: APS** 1: Manual
		A DF must be installed on the machine.	

Mode No.		Function	Settings
°22	SADF Shut-off Time	Selects shut-off time for SADF mode. *A DF must be installed on the machine.*	**0: 5 s.** 1: 60 s.
°23	ADF Free Size	Enables originals of various sizes to be fed from the same stack. *A DF must be installed on the machine.*	**0: No** 1: Yes
°26	Center Erase	Selects the width of the center erase margin in Erase Center mode (Program key + "6" + R/# key) or Erase Center and Edge mode (Program key + "8" + R/# key).	**0: 20 mm** 1: 10 mm 2: 15 mm 3: 25 mm
27	A3/11" x 17" Double Count	Selects single or double count for the total counter in A3/11" x 17" copies.	**0: Single** 1: Double
28	Auto Sort Select	Sort mode is automatically selected when more than one original is set on the DF table and the entered copy quantity is greater than 1 and less than 11. *The sorter and DF must be installed on the machine.*	**0: Manual** 1: Auto Sort
29	Fusing Temperature Control	Selects the fusing temperature control mode. *After selecting the control mode and turning the main switch off/on, the fusing temperature control mode is changed.*	**0: ON/OFF control** 1: Phase control
30	Toner Supply Mode	Selects the toner supply system. *See SP31/SP32 for the toner supply ratio.*	**0: Detect Mode** 1: Fixed Supply Mode
31	Toner Supply Ratio (Detect Supply Mode)	Selects the toner supply ratio for detect supply mode.	**0: 15%** 1: 7% 2: 30% 3: 60%
32	Toner Supply Ratio (Fixed Mode)	Selects toner supply ratio in fixed mode.	**0: 7.0%** 1: 3.5% 2: 10.5% 3: 14.0%
°33	ID Sensor Bias	Sets the development bias voltage applied to the development roller for the ID Sensor Pattern. This should only be adjusted if SP37 and SP48 cannot achieve the required image density. *0: Vo* *1: Vo+20V* *2: Vo–20V* *3: Vo–40V* *4: Vo+40V* *5: Vo–60V* *6: Vo+60V*	Toner Density **0: Normal (Vo)** 1: Low 2: High 3: Higher 4: Lower 5: Highest 6: Lowest

Mode No.		Function	Settings
34	ADS Level	Selects the image density level in ADS mode. *Data: 1* *Increases the grid voltage (–40 V). Exposure lamp voltage is not changed.* *Data: 2* *Increases the development bias voltage (–40V). Exposure lamp voltage is not changed.*	**0: Normal** 1: Darker 2: Lighter
35	ID Detection Interval	Toner density detection is performed every 5 copies or 10 copies.	**0: 10 copies** 1: 5 copies
36	Toner Saver Bias Voltage	Selects the bias voltage for the Toner Saver mode. (Refer to 6.5.4 Toner Saver Mode of section 2.) 0: Normal 1: Darker 2: Lighter	**0: –200 V** 1: –160 V 2: –240 V
37	Image Bias Adjustment ❐	Adjusts the development bias voltage for copying. *Use this SP mode, if the image density at level 4 cannot be adjusted to the required level by the Light Intensity Adjustment (SP48).* *0: Vo 3: Vo–20V* *1: Vo+40V 4: Vo–40V* *2: Vo+20V*	**0: Normal (Vo)** 1: Darkest 2: Darker 3: Lighter 4: Lightest
38	Toner End Recovery Check	Selects if the toner recovery check is done or not. (Refer to "6.9.3 Toner End Recovery" of section 2.)	**1: No** 2. Yes
40	Trailing Edge Erase Margin ❐	Adjust the trailing edge erase margin. *0.5 mm per step (max. –3.5 mm to +3.5 mm).*	1–15 **Default = 8 (0 mm)**
41	Lead Edge Erase Margin Adjustment ❐	Adjusts the lead edge erase margin. *0.5 mm per step (max. –3.5 mm to 3.5 mm).*	1–15 **Default = 8 (0 mm)**
42	Registration Adjustment ❐	Adjusts registration. *0.5 mm per step (max. +3.5 mm to –3.5 mm).*	1–15 **Default = 8 (0 mm)**
43	Vertical Magnification Adjustment ❐	Adjusts magnification in the paper feed direction. *0.2% per step (max. –1.4% to +1.4%). Do SP47 after this.*	1–15 **Default = 8**
44	Horizontal Magnification Adjustment ❐	Adjusts magnification perpendicular to the direction of paper feed. *0.2% per step (max. –3.0% to +3.0%). Do SP47 after this.*	1–31 **Default = 16**

Mode No.		Function	Settings
45	Registration Buckle-Cassette Feed ❐	Adjust the amount of paper buckle in the registration area. *0.5 mm per step (max. –3.5 mm to +3.5 mm).*	1–15 **Default = 8**
46	Registration Buckle-Tray Feed ❐		
47	Focus Adjustment ❐	Adjusts the 4th/5th mirror position to correct focus. *This mode must be done after vertical and horizontal magnification adjustments (SP43 and SP44).*	1–80 **Default = 40**
48	Light Intensity Adjustment ❐	Adjusts the exposure lamp voltage. 110 V machine: 1 step = 0.5 V 220 V machine: 1 step = 1.0 V ***The exposure lamp voltage is adjusted on the production line. If this value is changed, perform ADS reference voltage adjustment (SP56). The VL correction is cleared when this adjustment is performed.***	1–50 **Default = 26** (220 V machines = 126 V) (115 V machines = 63 V)
49	Fusing Temperature Adjustment	Adjusts the fusing temperature.	175–195°C **Default = 190°C**
51	Exposure Lamp Data Display	Displays the exposure lamp voltage. *The exposure lamp and optics cooling fans turn on for 10 seconds. Press the C/S key to turn this mode off. Do not repeat more than 5 times to avoid overheating the optics cavity.*	
52	Fusing Temperature Display ❐	Displays the fusing temperature.	
°53	Key Counter Count Timing	Determines the key counter count timing	0: At Paper Feed 1: At Paper Exit
54	Vsg Adjustment	Adjusts Vsg. *The machine automatically adjusts Vsg to 4.0 ± 0.1V while the "0" key is held down. (The voltage is displayed on the magnification indicator.) The main motor and the ID sensor LED turn on.*	
55	Vsg & Vsp Display ❐	Displays the Vsg and Vsp readings. The Vsg reading is displayed while the "0" key is held down. *When making copies, the Vsp and Vsg voltage readings are updated every 10 or 5 copies depending on SP35 (ID Detection Interval).*	

Mode No.		Function	Settings
56	ADS Reference Voltage Adjustment	Adjusts ADS.	
		After adjusting the light intensity, place 6 or more sheets of A3 or 11" x 17" white paper on the exposure glass and select this mode. The machine automatically adjust the ADS reference voltage to 2.5 V after the Start key is pressed. (The voltage is displayed.) The V_L *correction is cleared when this adjustment is performed.*	
57	Machine On Time	Displays the total hours that the main switch has been on.	
		The first three digits are displayed in the Magnification indicator. Hold down the "0" key to display the last three digits. *This counter is reset when Machine On Time Reset (SP94) is performed.*	
58	Drum Rotation Time	Displays the total hours that the drum has rotated.	
		The first three digits are displayed in the Magnification indicator. Hold down the "0" key to display the last three digits.	
59	Bias/Grid Voltage Display ❐	Displays the development bias voltage.	
		Press the Start key to display the bias voltage. While the "0" key is held down, the grid voltage is displayed.	
60	Standard Image Density Grid Voltage	Factory use only	1: –600 volts 2: –620 volts 3: –640 volts 4: –660 volts 5: –680 volts 6: –700 volts 7: –720 volts 8: –740 volts **9: –760 volts** 10: –780 volts 11: –800 volts 12: –820 volts 13: –840 volts 14: –860 volts 15: –880 volts 16: –900 volts 17: –920 volts
		Do not change setting. *The factory setting differs from machine to machine. Refer to "SP MODE FACTORY SETTING DATA" sheet located inside the front door.*	

Mode No.		Function	Settings
61	V_L Correction Interval	Sets the interval of V_L correction. *The exposure lamp data increases by +0.5 V at the set machine on time interval.*	**0: Auto V_L Correction** 1: 0.5 V/70 h 2: 0.5 V/20 h 3: 0.5 V/40 h 4: 0.5 V/140 h 5: 0.5 V/10 h 6: 0.5 V/5 h 7: No correction
62	Standard ID Sensor Grid Voltage	Factory use only ***Do not change data.*** *The factory setting differs from machine to machine. Refer to the "SP MODE FACTORY SETTING DATA" sheet located inside the front door.*	1: –480 volts 2: –500 volts 3: –520 volts 4: –540 volts **5: –560 volts** 6: –580 volts 7: –600 volts 8: –620 volts 9: –640 volts 10: –660 volts 11: –680 volts 12: –700 volts 13: –720 volts 14: –740 volts
°63	Toner Forced Supply	Used to recover from low toner concentration. *The main motor starts turning and the development bias voltage is applied to the development roller.* *Hold down or release the "0" key to turn the toner supply clutch on or off .* *Press the* R/# *key or the C/S key to stop and return to normal mode.*	
64	Toner Density Level Display	Displays the toner density level detected during initial setting (SP65). *Value Vsp/Vsg (%)* *0: 0–8* *1: 9–22* *2: 23–*	**0**–2
°65	Developer Initial Setting	Used to condition the new developer. *"50" is displayed on the copy counter when the* R/# *key is pressed. Press the Start key to start the initial setting.* ***Initial setting must be done when new developer is installed.*** *The copier automatically returns to normal mode after developer conditioning (50 cycles) is completed.*	

Mode No.		Function	Settings
66	Drum Initial Setting	Used to set up the machine for a new drum. Detects Vrp and performs Vr correction. ***Initial setting must be done when a new drum is installed.*** *The drum rotation time (SP58) and the drum counter (SP69) are cleared when the R/# key is pressed after "66" is entered.*	
67	Vr Ratio Display	Displays the present Vr ratio. *L = Vrp/Vsg x 100* *L(%) Grid voltage* *100 to 89 Vo* *88 to 76 Vo–40V* *75 to 62 Vo–80V* *61 to 45 Vo–120V* *44 to 0 Vo–160V*	
68	Vr Forced Detection	Detects Vrp and performs Vr correction. *The copier returns to normal mode after the R/# key is pressed.* *The detection is performed in the first 5 copy cycles after this SP mode is performed.*	
69	Drum Counter	Shows the total number of copies made with the drum now installed in the machine. *The first three digits are displayed in the magnification indicator. Hold down the "0" key to display the last three digits.*	
70	VL Correction Level Display	Displays the VL correction level.	
71	Sorter Identification	Enables sorter operation. *Sorter Mode 1: U4 is displayed when the sorter is opened.* *Sorter Mode 2: U4 is displayed when Sort/Stack mode is selected and the sorter is opened.*	**0: No sorter** 1: Sorter Mode 1 2: Sorter Mode 2
76	Sorter Bin Capacity	Sets the stock quantity limits.	0: No limits **1: Limits**
°78	Auto Energy Saver Mode	Selects the "Automatic Energy Saver" mode. *The copier automatically goes to Energy Saver mode after the selected auto reset time (SP15).*	**0: No** 1: Yes
83	Used Toner Counter Reset	Clears the used toner counter. Input "1" and then press the " R/# " key. This setting is only effective if SP115 is set to "0".	**0: No** 1: Yes
84	Factory Use	Do not change this setting.	Should be "0"

Mode No.		Function	Settings
°86	Energy Saving Temperature Setting	Selects the energy saving ratio. *The greater the saving ratio, the longer the waiting time until the copier returns to the ready condition.* *Saving Ratio Waiting Time* *0: 63% 30 s.* *1: 37% 20 s.* *2: 28% 10 s.* *3: 12% 0 s.*	0: 63% 1: 37% **2: 28%** 3: 12%
87	PM Interval Setting	Sets the PM interval. *When the PM counter exceeds the set interval, the Magnification indicator blinks.*	**0: No PM** 1: 40K 2: 60K 3: 80K 4: 100K
88	PM Counter Display	Displays the contents of the PM counter. *The first three digits are displayed in the Magnification indicator. Hold down the "0" key to display the last three digits.*	
89	PM Counter Reset	Resets the PM counter. *Enter "1" with the number keys and then press the "R/#" key to clear the counter.*	**0: No** 1: Yes
90	User Code Mode	Enables user code mode. ***JP101 on the main board must be cut.*** *If this mode is set, operators must enter a code to make copies. The user codes are the following 20 numbers:* *1101, 1202, 1303, 1404, 1505, 1606, 1707, 1808, 1909, 2010, 2111, 2212, 2313, 2414, 2515, 2616, 2717, 2818, 2919, 3020*	**0: No** 1: Yes
°91	User Code Counter Display	Displays the contents of each user code counter. *Use the Zoom keys ("+" or "–") to select a user code. The last two digits of the user code are displayed in the copy counter. User code counters count from 0 to 999999.* *The first three digits are displayed in the Magnification indicator. Hold down the "." key to display the last three digits.*	
°92	User Code Counter Clear	Resets all the user codes counters (SP91). *To reset, press "1" then the "Enter" key.*	**0: No** 1: Yes
°93	Copy Limit	Limits the maximum copy quantity that can be entered.	1–99 **99=default**
94	Machine On Time Reset	Resets the machine on time (SP57).	**0: No** 1: Yes
95	VL Correction Reset	Resets the VL correction.	**0: No** 1: Yes

Mode No.		Function	Settings
98	Clear Counters	Clears the following counters and the User Program:s • SP88: PM Counter Display • SP91: User Code Counter Display • SP100: 1st Feed Station Copies • SP101: 2nd Feed Station Copies • SP106: DF Originals • SP120: Total Service Calls • SP121: Optics Section Service Calls • SP122: Exposure Lamp Service Calls • SP124: Fusing Section Service Calls • SP125: Duplex Unit Service Calls • SP130: Total Misfeeds • SP131: Number of Misfeeds by Location • User Programs *DPS101-3 and 4 on the main board must be on to perform this SP mode. To clear, press "1" then the "* **R/#** *" key. See section 2.1.2, "Memory Reset Procedures" for details.*	**0: No** 1: Yes
99	Clear All Memory	Clears all the correction data for copy process control and software counters, and returns all modes and adjustments to the default settings. ***Normally, this SP mode should not be performed.*** *DPS101-3 and 4 on the main board must be on to perform this SP mode.* *To clear, press "1" then the "* **R/#** *" key. See section 2.1.2, "Memory Reset Procedures" for details.*	**0: No** 1: Yes
100	1st Feed Station Copies	Displays the total number of copies fed from the 1st feed station (cassette and manual feed table). *The first three digits are displayed in the Magnification indicator. Hold down the "." key to display the last three digits.*	
101	2nd Feed Station Copies	Displays the total number of copies fed from the 2nd feed station. *The first three digits are displayed in the Magnification indicator. Hold down the "." key to display the last three digits.*	
106	DF Originals Counter	Displays the total number of originals fed from the DF. *The first three digits are displayed in the Magnification indicator. Hold down the "." key to display the last three digits.*	
112	Toner Overflow Counter Display	Displays the total number of copies after the toner overflow counter is reset (SP83).	

Mode No.		Function	Settings
115	Used Toner Overflow Detection	Determines the method of toner overflow detection. 0: The CPU counts the copy number to detect toner overflow. 1: The toner overflow sensor detects toner overflow condition.	**0: Toner overflow counter** 1: Toner overflow sensor
		An optional toner overflow sensor must be installed to use method 1.	
116	Toner Overflow Setting	Determines the number of copies when "E70" is displayed after the toner overflow counter is cleared.	**0: 60 K** 1: 40 K 2: 80 K 3: 100 K
120	Total Service Calls	Displays the total number of service call conditions.	
121	Optics Section Service Calls	Displays the total number of "optics section" service call conditions.	
122	Exposure Lamp Service Calls	Displays the total number of "exposure lamp" service call conditions.	
124	Fusing Section Service Calls	Displays the total number of "fusing section" service call conditions.	
130	Total Misfeeds	Displays the total number of paper misfeeds excluding original misfeeds in the DF.	
		The first three digits are displayed in the Magnification indicator. Hold down the "." key to display the last three digits.	
131	Number of Misfeeds by Location	Displays the total number of paper misfeeds in each area.	
		Use the Zoom key ("+" or "–") to select the desired number. *1: Paper Feed* *2: Exit* *3: Sorter* *4: DF* *The first three digits are displayed in the Magnification indicator. Hold down the "." key to display the last three digits.*	

2.3 SP-8 SENSOR/SWITCH DATA CHECK

– How to check sensor/switch inputs –

1. Press "8", then press the R/# key.
2. Enter the desired input number with the number keys. The input numbers are given in the following table.
3. Press the R/# key again.
4. Enter the number of copies and press the Start key.

   NOTE: The ON/OFF status can also be checked manually.
5. The input (0 or 1) will be displayed in the magnification indicator.

Input No.	Sensor/Switch/Signal	Input Value	
		0	**1**
1	Registration Sensor	Paper not detected (HIGH)	Paper detected (LOW)
2	Exit Sensor		
4	1st Paper End Sensor	Sensor feeler down (Paper end) (HIGH)	Sensor feeler up (LOW)
5	2nd Paper End Sensor		
9	Manual Feed Table Switch	Table closed (HIGH)	Table open (LOW)
10	Right Cover Switch	Cover closed (HIGH)	Cover open (LOW)
17	Scanner HP Sensor	Not home position (HIGH)	Home position (LOW)
18	Lens HP Sensor		
19	4th/5th Mirror HP Sensor		
21	Toner Overflow Sensor	Not Overflow (HIGH)	Overflow (LOW)
28	Sorter Paper Sensor	Paper not detected (High)	Paper detected (Low)
29	Sorter Wheel Switch	Paper feed position	No paper feed position
30	Sorter HP Switch	Not home position	Home position
31	Sorter Switch	Sorter opened	Sorter closed
32	ADF ON Line	ADF not installed	ADF installed
33	ADF Lift Sensor	ADF closed	ADF opened
35	Cassette Size	See note 1.	

NOTE 1: Paper size switch status is displayed on notches 1 to 5 of the image density indicator.

2.4 SP-9 ELECTRICAL COMPONENT CHECK

– How to turn electrical components on/off –

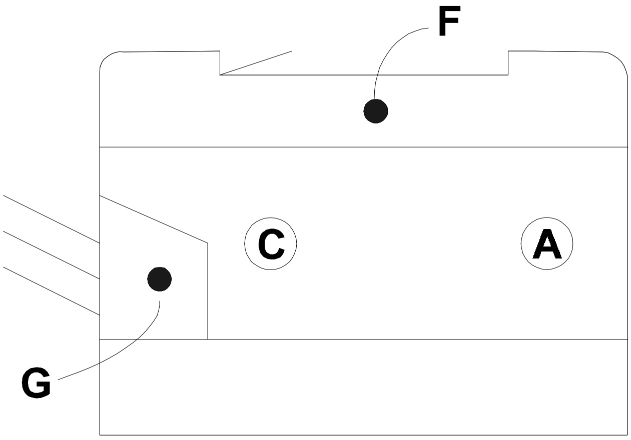
1. Enter "9", then press the R/# key.
2. Enter the desired output number with the number keys. The output numbers are given in the following table.
3. Press the Start key to turn on the electrical component.
4. Press the C/⊙ key to turn off the electrical component.

Output No.	Electrical Component
1	Main Motor
2	Charge Corona + Standard Grid
3	Charge Corona + ID Sensor Grid (Grid Voltage = Standard ID sensor grid + Vp Correction Factor)
4	Charge Corona + Vrp Grid (Grid Voltage = –500 volts)
5	Transfer Corona
8	Separation Corona
9	ID Sensor LED
11	Toner Supply Clutch
12	Total Counter
14	Sorter Roller Drive Motor
15	Sorter Wheel Motor (Bin up)
16	Sorter Wheel Motor (Bin down)
17	Registration Clutch
18	1st Paper Feed Clutch
19	2nd Paper Feed Clutch
23	Relay Roller Clutch
37	Erase Lamp
39	Optics Cooling Fans
40	Exposure Lamp + Optics Cooling Fans
42	Charge Corona + Standard Grid + Transfer Corona + Separation Corona
43	Charge Corona + ID Sensor Grid + Transfer Corona + Separation Corona
44	Charge Corona + Vrp Grid + Transfer Corona + Separation Corona
50 - 58	Applies bias voltage in 40 V steps starting at –120 V
60 - 68	Applies grid voltage in 60 V steps starting at –560 V

2.5 MISFEED LOCATION INDICATOR

2.5.1 Misfeed Indication

The following table shows the correspondence between the indicators and the sensors detecting the misfed paper:



A173M500.wmf

Misdeed Location	Misfeed location indicator
1st feed station (cassette or manual feed)	A blinks
2nd feed station	A blinks
Paper exit section	C blinks
Document feeder	F blinks
Sorter paper sensor	G blinks

NOTE: If a misfeed is detected at power on, the indicator of the misfeed location lights.

2.5.2 Misfeed Recovery

1) Copier
The misfeed condition is cleared when the front door is closed after the misfed paper is removed.

2) DF
The misfeed condition is cleared when the DF is closed after the misfed paper is removed.

3) Sorter
The misfeed condition is cleared when the sorter is closed after the misfed paper is removed.

3. SERVICE TABLES

3.1 DIP SWITCHES

Copier Main Board

DPS	Normal	Function
101-1	OFF	Free run
101-2	OFF	Forced start (Ready temperature ignored) **Factory use only**
101-3 101-4	OFF OFF	To clear memory counters with SP98 or to clear all memory with SP99

NOTE: a) Free run starts when the Start key is pressed. To stop the free run, press the C/S key.

b) The copy quality cannot be guaranteed if the fusing unit has not yet reached standard operating temperature.
To cancel this mode, turn off DPS101-2, then turn the main switch off and on.
This mode must not be used in the field. The fusing and pressure rollers may be damaged when toner remaining on the rollers melts.

DF Main Board

DPS101				Function
1	2	3	4	
ON	OFF	OFF	OFF	Normal mode for this copier
ON	OFF	OFF	ON	One-sided free run
OFF	ON	OFF	ON	Two-sided free run
OFF	OFF	ON	ON	Solenoid test: Switch 101 - solenoids ON Switch 102 - solenoids OFF
ON	ON	OFF	ON	Motor test
ON	ON	ON	ON	All indicators ON

NOTE: a) To use all functions, DPS101 must be set to the normal mode when the main switch is turned on. At this time, the initial sequence between the copier and the DF will take place.

b) To use all functions except for the solenoid test mode, the lift switch must be turned on.

c) To use the one and two-sided free run modes, all sensors must be activated in the normal manner. Therefore, place the DF in the normal working position (down) and place paper on the original table. Then, turn on SW101 at the rear side of the DF.

3.2 VARIABLE RESISTORS

CC/Grid/Bias Power Pack

Number	Function
VRC	Adjusts charge corona current
VRG	Adjusts grid voltage
VRB	Adjusts development bias voltage

TC/SC Power Pack

Number	Function
VRT	Adjusts transfer corona current
VRD	Adjusts separation corona current

DF Main Board

Number	Function
VR101	Factory use only
VR102	Original leading edge registration adjustment (One-sided original mode)
VR103	Original leading edge registration adjustment (Two-sided original mode)
VR106	Factory use only

4. SPECIAL TOOLS AND LUBRICANTS

Part Number	Description	Q'ty
A0069105	Drum Shoe Shaft	1
A0069103	Scanner Wire Clamper (Omega Clamp)	1
A0069104	Scanner Positioning Pin (4 pcs)	1 set
A0089502	Grease G-40M	1
52039501	Grease (Shinetsu Silicone G-501)	1
54429106	Drum Shoe	1
54479104	Shoe Adapter	1
54209507	Digital Multimeter	1
54479078	Heat Resistant Grease (MT-78)	1
54209516	Test Chart OS-A3 (10 pcs/set)	
54209502	Test Chart OS-A3 (100 pcs/set)	

5. PREVENTIVE MAINTENANCE SCHEDULE

5.1 PM TABLE

L = Lubricate R = Replace C = Clean I = Inspect

	EM	60K	120K	180K	240K	Notes
Optics						
Mirrors, Lens, Reflectors	C	C	C	C	C	Cotton pad with water, or blower brush
Exposure Glass	C	C	C	C	C	Alcohol or glass cleaner
Platen Cover Sheet	C	R	R	R	R	Alcohol or water (replace if necessary)
Scanner Guide Plate		C	C	C	C	Dry cloth
Lens and 4th/5th Mirror Guide Rails		C	C	C	C	Dry cloth
Paper Feed (for each paper feed station)						
Paper Feed Rollers	C		R		R	Water
Registration Roller		C	C	C	C	Water (replace if necessary)
Relay Roller		C	C	C	C	Water
Paper Feed Guide Plate		C	C	C	C	Alcohol
Cassette Bottom Plate Pad		C	R	C	R	Water
Paper Tray Bottom Plate Pad		C	R	C	R	Water
Friction Pad		C	R	C	R	Water
Registration Sensor		I	I	I	I	
Around Drum						
Corona Wires	C	R	R	R	R	Dry cloth or water
Wire Cleaner		R	R	R	R	
Charge Grid		C	R	C	R	Blower brush
End Blocks and Casing	C	C	C	C	C	Alcohol or water
Transfer Guide Plate		C	C	C	C	Dry cloth
Quenching Lamp	C	C	C	C	C	Dry cloth
ID Sensor	C	C	C	C	C	Blower brush
Erase Lamp	C	C	C	C	C	Dry cloth
Pick-off Pawls	C	C	C	C	C	Suitable solvent (replace if necessary)
Cleaning Unit						
Cleaning Blade			R		R	

	EM	60K	120K	180K	240K	Notes
Cleaning Seal		I	I	I	I	Replace if necessary
Used Toner Tank	C	C	C	C	C	Empty used toner
Development Unit						
Developer		R	R	R	R	Replace if necessary
Inlet Seal		I	I	I	I	Replace if necessary
Fusing Unit						
Hot Roller				R		
Pressure Roller				R		
Stripper Pawls		C	C	C	C	Suitable solvent, replace if necessary
Fusing Entrance and Exit Guides		C	C	C	C	Suitable solvent
Fusing Thermistor		I	I	I	I	Suitable solvent, clean if necessary
Others						
Ozone Filters		R	R	R	R	
Drive Belt		I	I	I	I	Replace if necessary
Bushings		I	I	I	I	Lubricate if necessary (Spindle oil)
Exit Sensor		I	I	I	I	
Document Feeder PM interval: number of original fed (SP106)						
Transport Belt	C	C	R	C	R	Belt cleaner
Friction Belt	C	R	R	R	R	
Pick-up Roller		C	C	C	C	Water, replace if necessary
Feed Roller		C	C	C	C	Water, replace if necessary
Feed-in Clutch		L	L	L	L	Mobil Temp. 78
Sorter						
Bin Guide/Wheel		L	L	L	L	Grease G501 (if necessary)
Round Belt		C	C	C	C	Alcohol
Guide Plate		C	C	C	C	Dry cloth

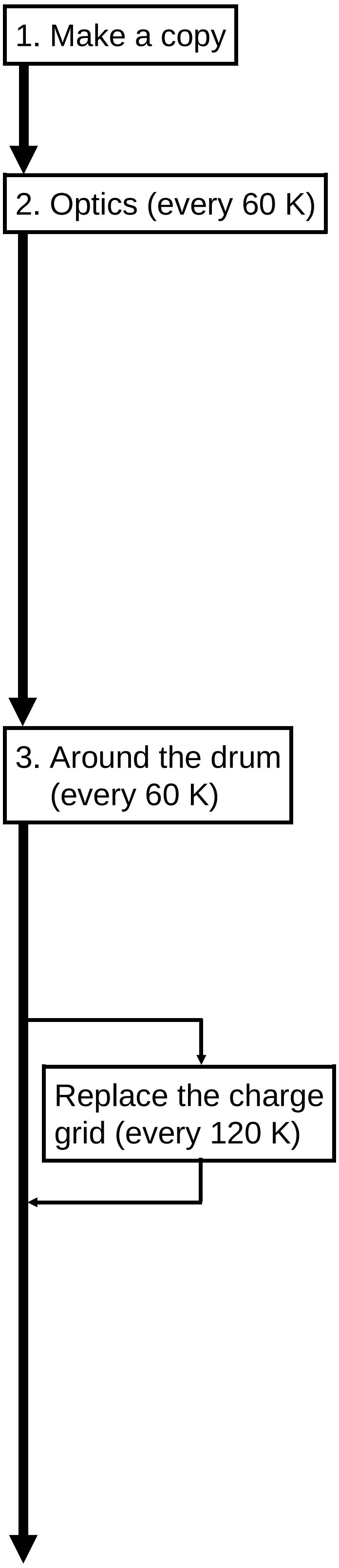
5.2 EXPLANATION OF REGULAR PM

Item		Explanation
Optics Unit	Mirrors, Lens, Reflector, Exposure Glass, Platen Cover	Stains on any part of the optics unit result in a dirty background, black lines, black spots, or areas of decreased sharpness on the copy. Periodic cleaning is required. The exposure glass and the platen cover must also be cleaned. If stains on the platen cover cannot be removed, it must be replaced.
	Exposure Lamp	Deterioration of the exposure lamp affects the copy image. Inspect the lamp at regular intervals and replace if discolored.
Paper Feed, and Registration	Paper Feed Roller	If paper powder or dust adheres to the paper feed rollers and/or rollers are worn out, paper may not feed correctly and/or skewing may result. Cleaning or replacement is required at regular intervals.
	Registration Roller	A dirty registration roller can cause paper to register incorrectly, skew, or misfeed. Cleaning is required at regular intervals.
Transport	Transfer Guide Plate	If the transfer guide plate is dirty, the back sides of the copy may become dirty. Clean the plate at regular intervals.
Around the Drum	Charge Wires	Dirty charge wires may cause uneven image density. They should be cleaned or replaced at regular intervals.
	End Blocks	Toner tends to accumulate on the corona end blocks, and this can result in poor copy quality or even a high voltage leak. Clean end blocks at regular intervals.
	Quenching Lamp (QL)	If toner accumulates on the QL, dirty background or a repeating negative image may result. Clean the QL at regular intervals.
	ID Sensor	If paper dust or toner accumulates on the ID sensor, the toner density cannot be controlled correctly. This results in light copies or overtoning. Clean this sensor at regular intervals.
	Erase Lamp	If toner accumulates on the erase lamp, dirty background may occur that becomes progressively worse during long copy runs. Clean this lamp at regular intervals.
Cleaning Unit	Cleaning Blade	A dirty or worn out cleaning blade will cause black lines on copies and/or scratches on the drum. The blade must be replaced or cleaned at regular intervals.
	Used Toner Tank	If the used toner tank becomes full, "E70" lights in the copy counter and copying becomes disabled. To prevent unnecessary EM calls, the used toner tank should be emptied at regular intervals. Reset the toner overflow counter (SP83) after disposing of used toner.

Item		Explanation
Fusing Unit	Thermistor	If toner accumulates on the thermistor, fusing temperature control may not be accurate. Inspect the thermistor at regular intervals.
	Stripper Pawls	Toner or dust adhering to the stripper pawls can cause a paper misfeed. Clean or replace the pawls at regular intervals.
	Fusing Entrance and Exit Guides	Toner piling up on the guide plate will cause dirty background on the copy. Clean the guide plate at regular intervals.
DF	Transport Belt	A dirty transport belt can leave stains on copies. Clean or replace the belt at regular intervals.
	Pick-up Roller, Feed Roller, Separation Belt	When dirty, these rollers and this belt can leave stains on the copy paper. Clean or replace these parts at regular intervals.
Sorter	Bin Drive Wheel, Bin Guide	Dust adhering to the bin drive wheel or bin guide may interfere with bin movement and result in uneven bin positioning. Clean and lubricate if necessary.

5.3 REGULAR PM PROCEDURE

➡ Every 60 K
→ Every 120 K or 180K


1. Make a copy
2. Optics (every 60 K)
3. Around the drum (every 60 K)
Replace the charge grid (every 120 K)

1. Make a copy

Make a copy of your test chart at manual image density level 4.

2. Optics (every 60 K)

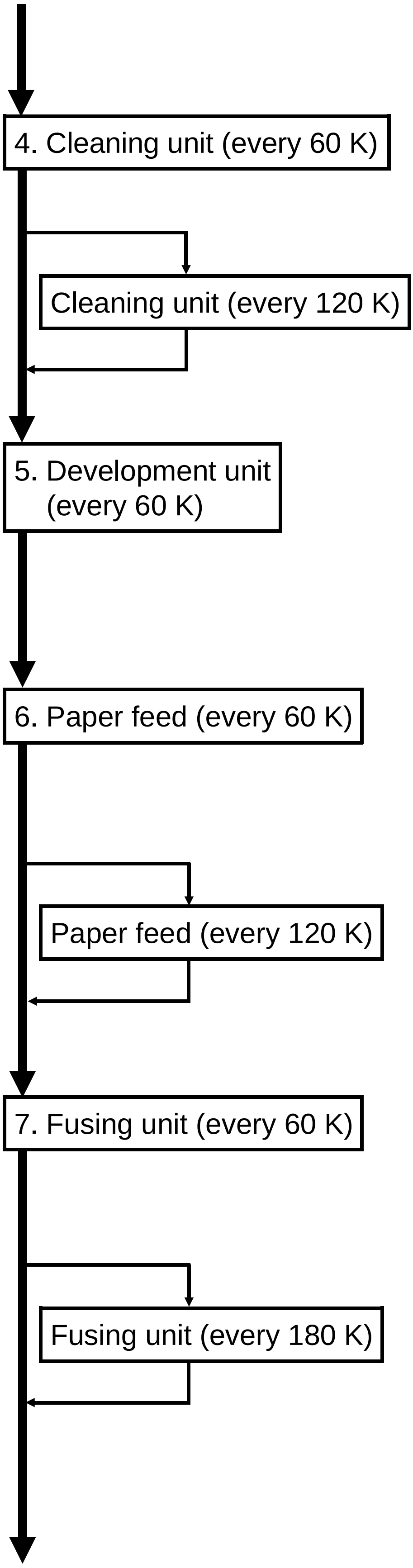
1. Clean the mirrors, lens and reflectors with a soft cloth, cotton pad with water, or a blower brush.
2. Clean the exposure glass with alcohol or water.
3. Clean the scanner guide rail with a dry cloth.
4. Clean the lens and 4th/5th guide rails with a dry cloth.
5. Clean the original width and length sensors with a blower brush.
6. Replace the platen cover sheet.
7. Clean the optics cooling fan filter.

3. Around the drum (every 60 K)

Note: After removing the drum, wrap the drum in clean sheets of paper to protect it.

1. Clean the ID sensor with a blower brush.
2. Clean the pick-off pawls.
3. Clean the quenching lamp, and erase lamp with a dry cloth.
4. Clean the end blocks, casing and transfer guide plate with water or alcohol.
5. Replace the corona wires and wire cleaner.
6. Clean the charge grid with a blower brush.
7. Clean the registration rollers.
8. Inspect the movement of the registration sensor feeler.

Replace the charge grid (every 120 K)



4. Cleaning unit (every 60 K)

1. Empty the used toner tank.
2. Clean the inside of the cleaning unit and the seals.

Cleaning unit (every 120 K)

1. Replace the cleaning blade.

5. Development unit (every 60 K)

1. Clean the development unit guide plate in the copier with a damp cloth.
2. Remove the old developer.
3. Clean the development unit and gears.
4. Install the new developer.

6. Paper feed (every 60 K)

1. Clean the relay roller, registration roller, and paper feed guide plates.
2. Clean the bottom plate pads on the manual feed table, cassette and paper tray.

Paper feed (every 120 K)

1. Replace the paper feed roller.
2. Replace the bottom plate pads on the manual feed table, cassette, and paper tray.

7. Fusing unit (every 60 K)

1. Clean the entrance guide plate.
2. Inspect the thermistor.
3. Clean the stripper pawls.
4. Replace the ozone filters.

Fusing unit (every 180 K)

1. Replace the hot roller and pressure roller.

8. Copy quality

1. Perform the developer initial setting (SP65), if the developer has been replaced.
2. Reset the toner overflow counter (SP83) if the used toner has been disposed of.
3. Perform the drum initial setting (SP66), if the drum has been replaced.
4. Perform the V_L correction reset (SP94).
5. Adjust the exposure lamp intensity (SP48).
6. Adjust the ADS reference voltage (SP56).
7. Adjust the Vsg voltage (SP54).
8. Make a copy of the OS-A3 test chart at manual image density level 4 and perform copy quality adjustments if necessary.

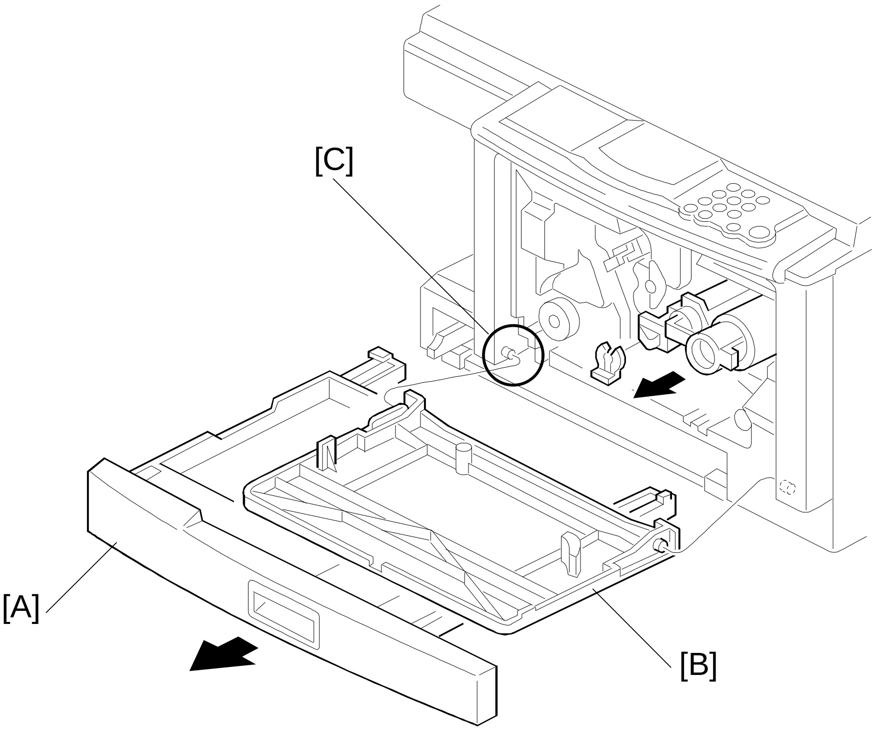
SECTION 5

REPLACEMENT AND ADJUSTMENT

1. EXTERIOR AND INNER COVERS

1.1 EXTERIOR COVER REMOVAL

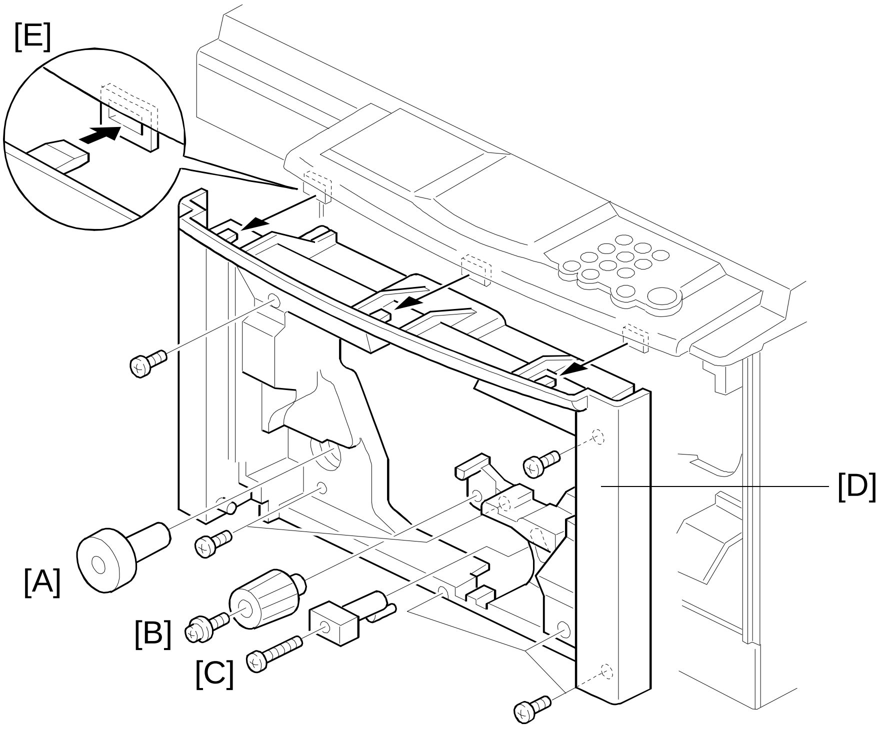
1.1.1 Front Door



A173R500.wmf

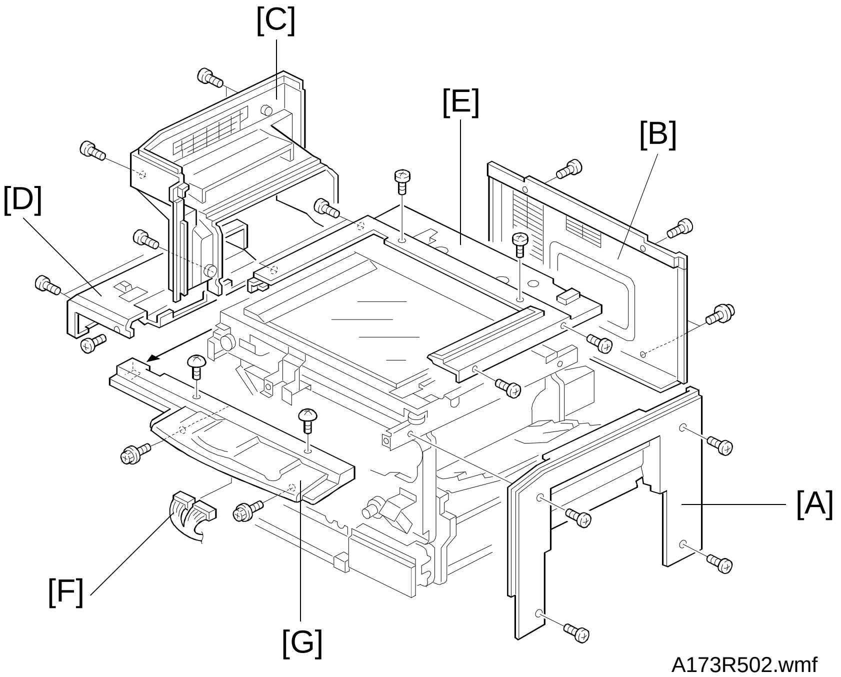
1. Pull out the paper feed tray [A].
2. Open the front door [B].
3. Disengage the pin [C] from from its hole in the front door. Then remove the front door.

1.1.2 Inner Cover



A173R501.wmf

1. Pull out the paper feed tray.
2. Remove the front door.
3. Remove the development unit (1 snap ring).
4. Remove the fusing roller knob [A].
5. Remove the registration knob [B] and the paper guide lever [C] (1 screw each).
6. Remove the seven screws holding the inner cover [D].
7. Disengage the three hooks [E] of the inner cover from the main body.



A173R502.wmf

1.1.3 Right Cover

1. Open the manual feed table.
2. Remove the right cover [A] (4 screws).

1.1.4 Rear Cover

1. Remove the rear cover [B] (4 screws).

1.1.5 Left Covers

1. Pull out the paper tray.
2. Remove the left cover [C] (4 screws) and lower left cover [D] (3 screws).

1.1.6 Upper Cover

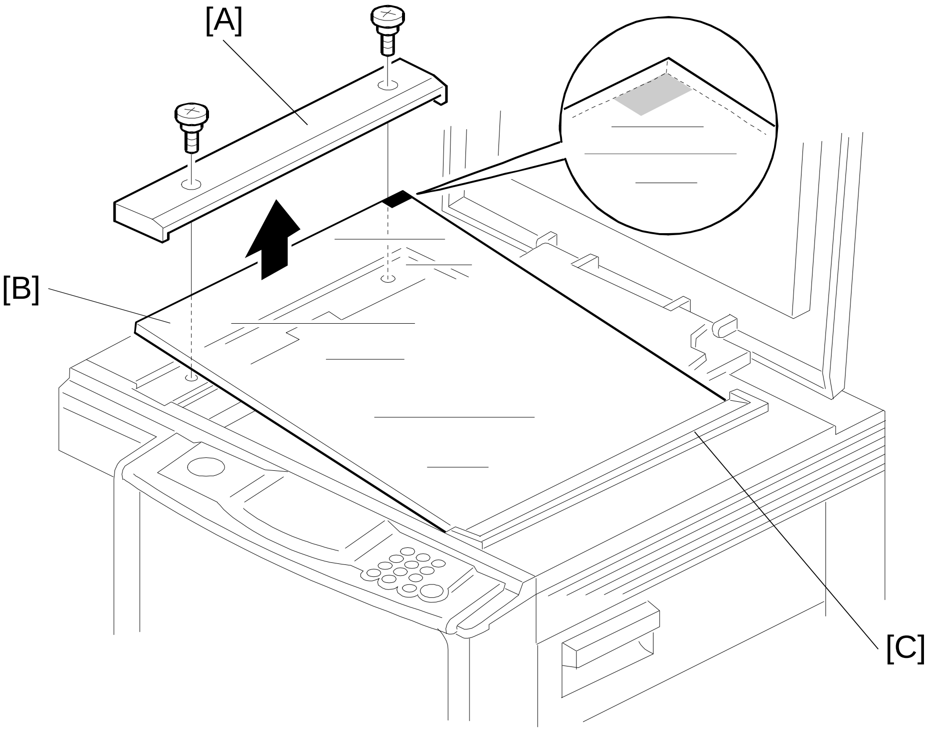
1. Remove the platen cover (4 screws).
2. Remove the upper cover [E] (6 screws).

1.1.7 Operation Panel

1. Remove the front door and the inner cover.
2. Disconnect the two connectors [F].
3. Remove the operation panel [G]. (4 screws).

2. OPTICS

2.1 EXPOSURE GLASS REMOVAL



A173R503.wmf

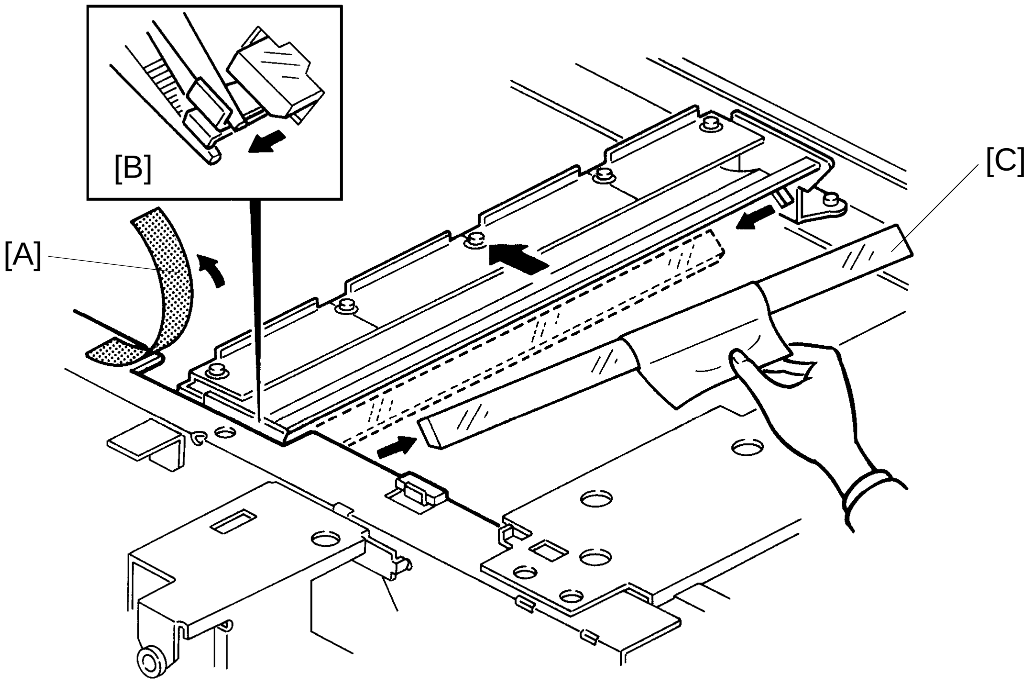
1. Unplug the power cord.
2. Take off the left scale [A] (2 short screws).
3. Grasp the left edge of the exposure glass [B] and lift it up slightly. Slide the other edge out from under the right glass holder [C]. Remove the exposure glass.

NOTE: When reinstalling the exposure glass, make sure of the following:

a) The left edge of the glass is flush with the tab to the left of the scale plate, and the right glass holder firmly secures the exposure glass.

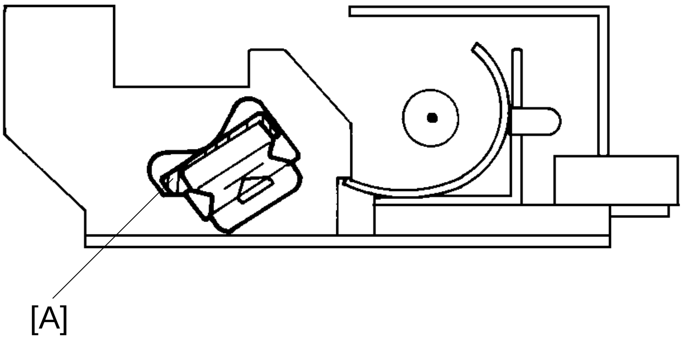
b) The red mark on the edge of the glass faces up. This side is smoother and it generates less static electricity when the DF is used.

2.2 1ST MIRROR REMOVAL



A173R504.img

1. Unplug the power cord.
2. Remove the exposure glass. (See Exposure Glass Removal.)
3. Move the first scanner to the cutout position (150 mm from the left scale).
4. Remove the upper cover.
5. Peel off the rear cutout cover seal [A].
6. With a pair of pliers, remove the rear spring plate [B].
7. Carefully slide the 1st mirror [C] towards the rear of the machine and lift the mirror out of the machine front side first.



A173R505.img

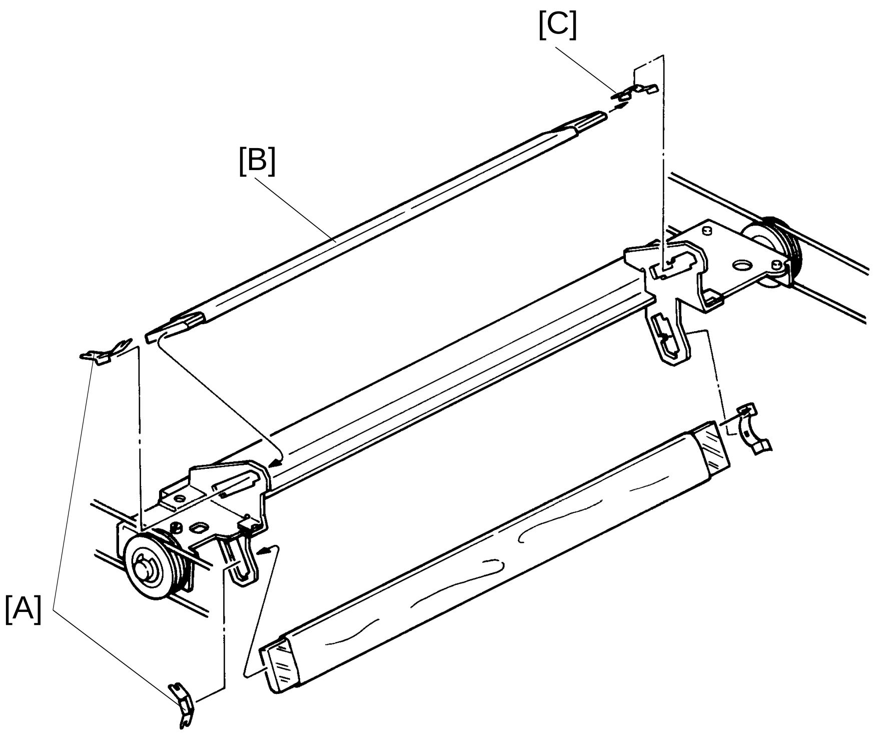
– Reinstallation –

1. Insert the 1st mirror into the rear side plate cutout. Then insert the front side of the mirror into the front spring plate.

   NOTE: Make sure when installing the mirror that the reflecting surface is on the upper side and the beveled edge [A] of the mirror is on the lower side.

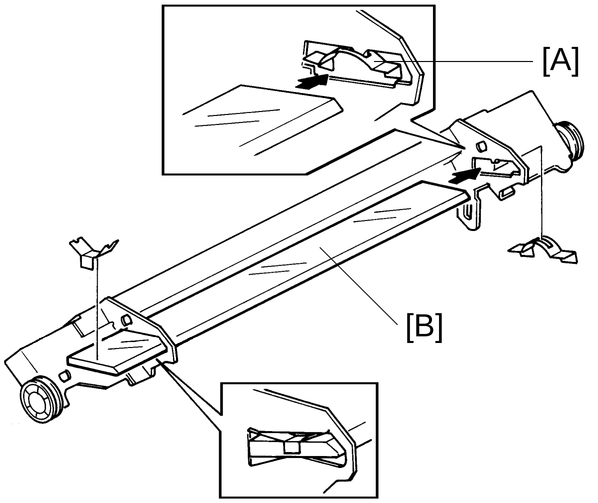
2. Insert the rear spring plate between the mirror and the rear side plate cutout.

2.3 2ND AND 3RD MIRROR REMOVAL

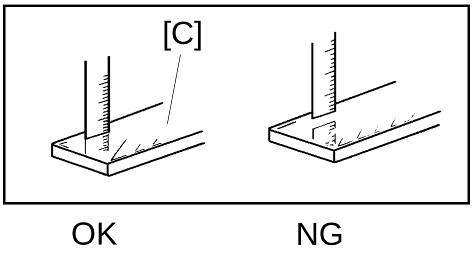


A173R506.img

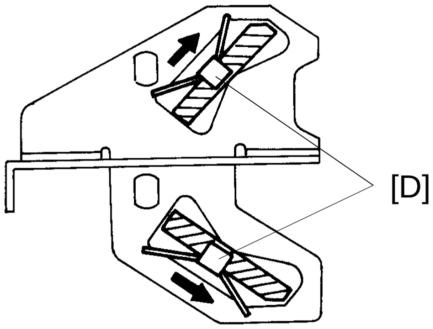
1. Unplug the power cord.
2. Remove the exposure glass. (See Exposure Glass Removal.)
3. Slide the 1st scanner two-thirds of the way to the right.
4. Press down on one side of the front spring plate [A] and pull it off the end of the mirror.
5. Carefully shift the 2nd mirror [B] towards the front of the machine to remove the rear spring plate [C].
6. Lift the mirror out of the machine rear side first.



A173R507.img



A173R508.img



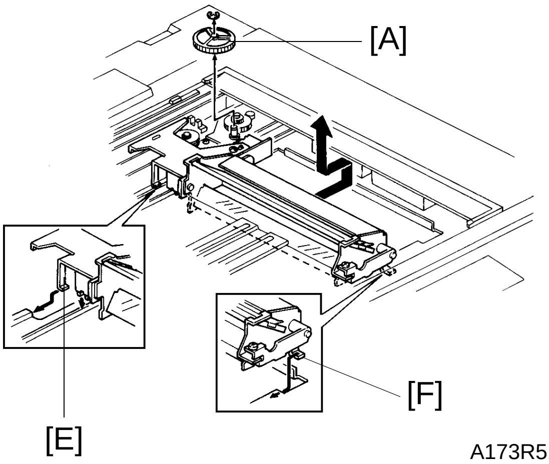
A173R509.img

– Reinstallation –

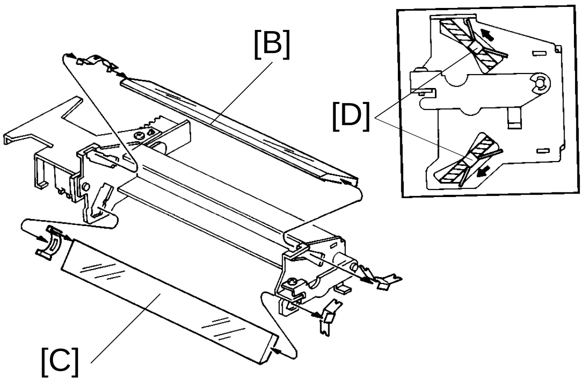
1. Hold the rear spring plate [A] in position as shown.
2. Insert the 2nd mirror [B] into the front side plate cutout.
3. Position the rear end of the mirror under the rear spring plate in the rear side plate cutout.
4. Fit the front spring plate over the front end of the mirror. Make sure that the slot on each arm of the spring plate fits over the edge of the cutout as shown.

NOTE: a) Make sure when installing the mirrors that the reflecting surfaces [C] face the lens.
b) The front and rear spring plates are different. Make sure that each plate is placed in the correct position.
c) Position the spring plate [D] by moving it in the direction of the arrow.

2.4 4TH AND 5TH MIRROR REPLACEMENT



A173R510.img



A173R511.img

1. Unplug the power cord.
2. Remove the exposure glass. (See Exposure Glass Removal.)
3. Remove the lens cover (2 screws).
4. Remove the 4th and 5th mirror assembly drive gear [A] (1 E-ring).
5. Slide the mirror assembly all the way to the right and remove it.
6. Replace the fourth [B] and fifth [C] mirrors. (The procedure for removing the mirrors from their brackets is the same as for the second and third mirrors.)

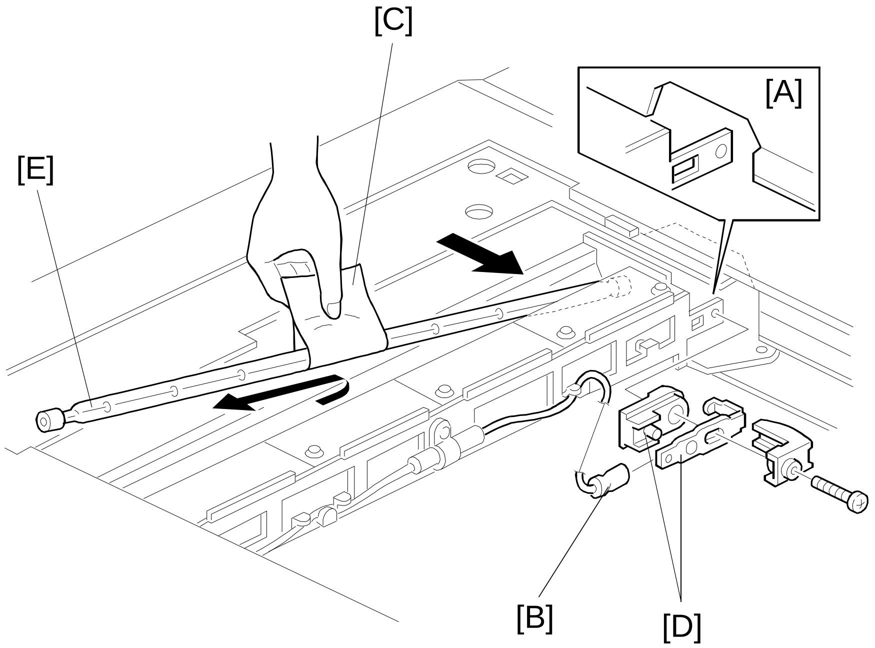
NOTE: a) Make sure that the mirrors are installed in their original positions. (The fourth mirror is larger than the fifth mirror.)

b) The front and rear spring plates are different. Be sure to mount them in the correct positions.

c) Position the spring plates [D] as shown. Move them in the direction of the arrow.

d) When reinstalling the 4th and 5th mirror assembly, make sure that the hooks [E and F] are properly positioned as shown.

2.5 EXPOSURE LAMP REPLACEMENT

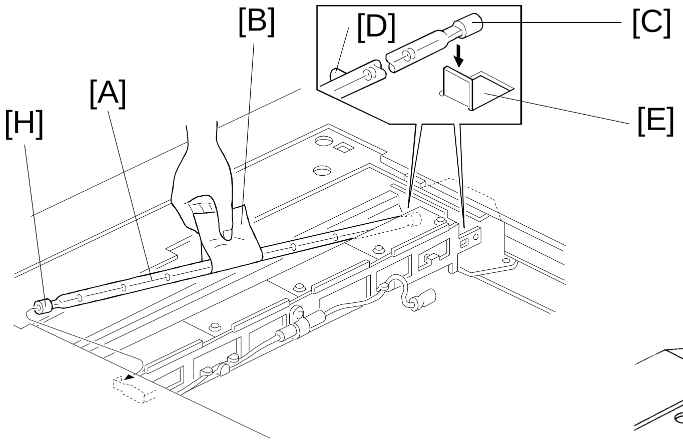


A173R512.wmf

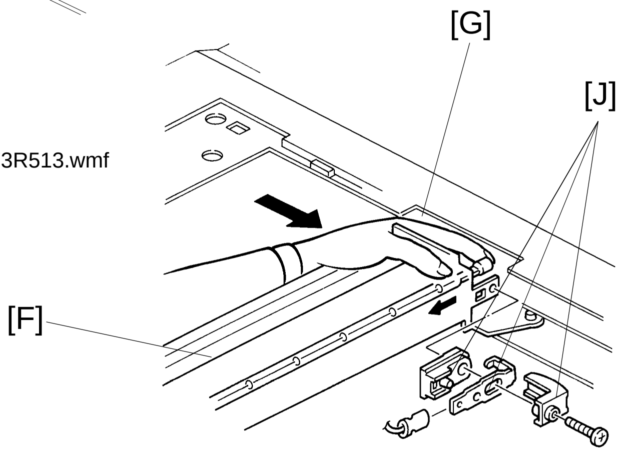
NOTE: Do not touch the reflector or the new exposure lamp with your bare hands. Use a strip of paper as shown. (Oil marks from fingers on the lamp or reflectors will be affected by heat from the lamp and will cause discoloration.)

– Removal –

1. Unplug the power cord.
2. Remove the exposure glass. (See Exposure Glass Removal.)
3. Move the first scanner to the cutout position in the rear frame [A] as illustrated (about 50 mm).
4. Disconnect the exposure lamp wire [B].
5. Wrap a strip of paper [C] around the exposure lamp.
6. Remove the rear terminal [D] (1 screw).
7. Remove the exposure lamp [E] from the front terminal by moving the lamp into the rear frame cutout.



A173R513.wmf



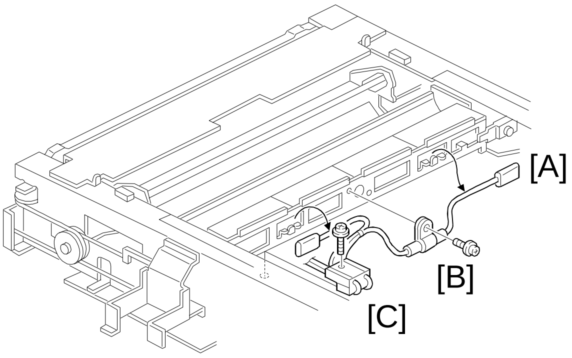
A173R514.img

– Reinstallation –

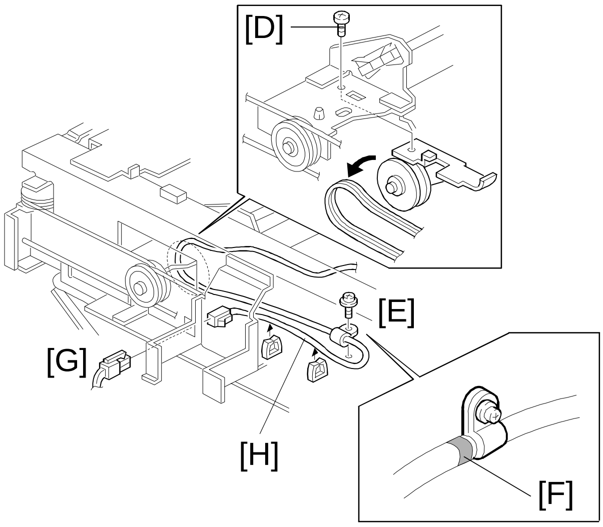
8. Hold the lamp [A] with a strip of paper [B].
9. Before sliding in the lamp, position it so that the flat ends [C] are horizontal and the blister [D] is pointing towards the reflector opening.
10. Carefully slide in the lamp [A] and place it on the plate [E].
11. Move the first scanner [F] to the right (about 50 mm) to the frame's cutout position [G].
12. Set the front insulator [H] in the front terminal [I], and while holding the lamp with your left hand, lightly push it towards the front.
13. With your right hand, screw in the rear terminal [J].

    NOTE: Make sure that both front and rear insulators are properly supported with the terminals.
14. Clean the optics parts.
15. Perform the light intensity adjustment using SP48. (See the Light Intensity Adjustment section.)
16. Perform the ADS adjustment using SP56.

2.6 OPTICS THERMOFUSE REMOVAL



A173R515.wmf



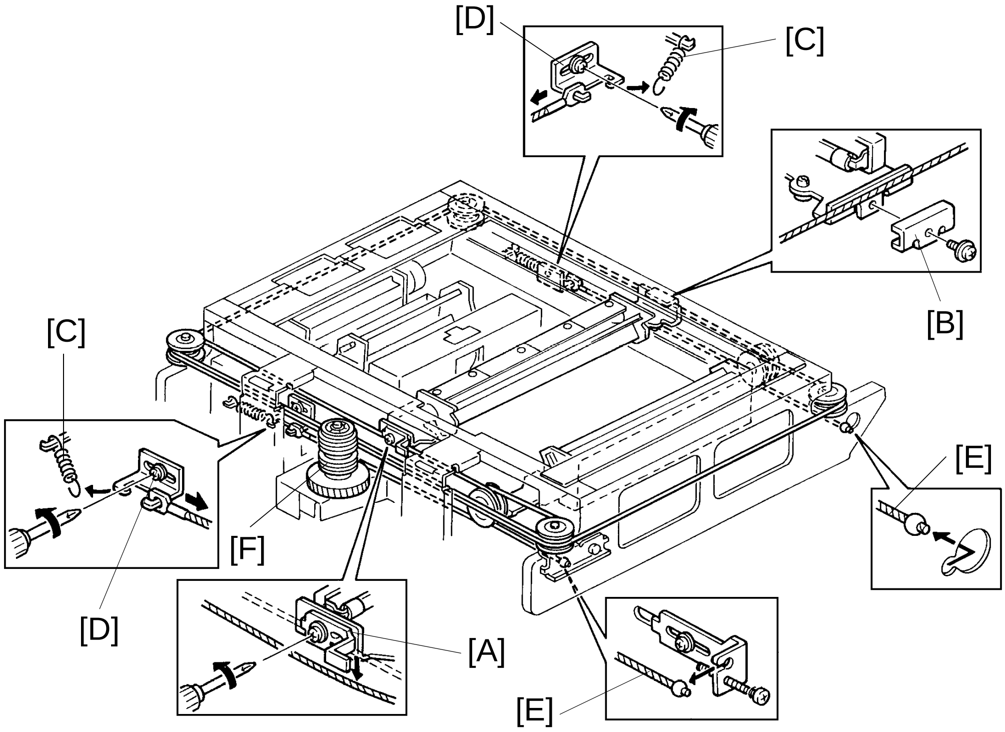
A173R516.wmf

1. Unplug the power cord.
2. Remove the front door, development unit, paper tray, and inner cover.
3. Remove the exposure glass.
4. Move the first scanner to the right (about 50 mm) to the frame’s cutout position.
5. Disconnect the lamp connector [A].
6. Remove the harness clamper [B] (1 screw).
7. Remove the screw [C] securing the harness holder.
8. Remove the lamp harness pulley [D].
9. Remove the harness clamper [E] (1 screw).

   NOTE: When reinstalling the harness clamper, align the white mark [F] on the harness with the left edge of the clamper as shown.
10. Disconnect the lamp connector [G].
11. Replace the thermofuse [H].

2.7 SCANNER DRIVE WIRE REPLACEMENT

2.7.1 Wire Removal



A173R517.img

1. Remove the following covers and parts.

    Sorter (if installed)
    Front door
    Inner cover
    Left upper cover
    Right cover
    Operation panel
    TC/SC power pack
    Document feeder (if installed)
    Development unit
    Left cover
    Rear cover
    Upper cover
    Exposure glass
    Charge/grid/bias power pack

2. Loosen the screws securing the front [A] and rear [B] first scanner wire clamps.

3. Remove the front and rear wire tightening springs [C].

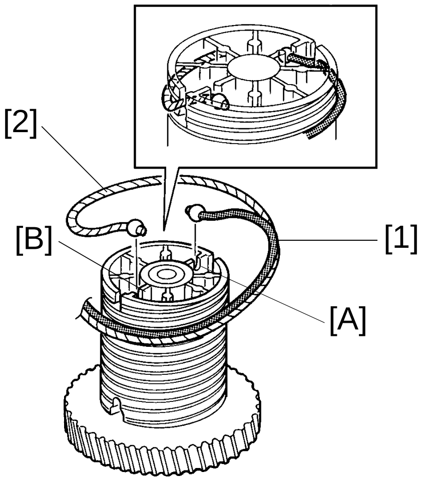
4. Loosen the screws securing the front and rear wire securing plates [D].

5. Remove the scanner wires [E] from the left side plate.

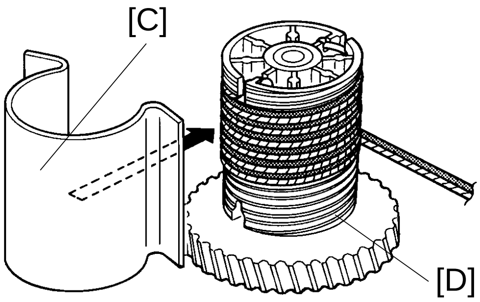
6. Remove the scanner wires from the drive pulley [F].

8. Remove the drive pulley (1 E-ring).

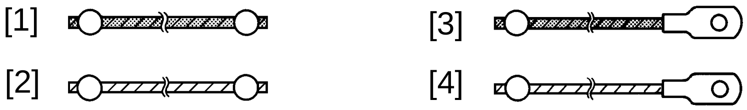
2.7.2 Wire Installation



A173R518.img



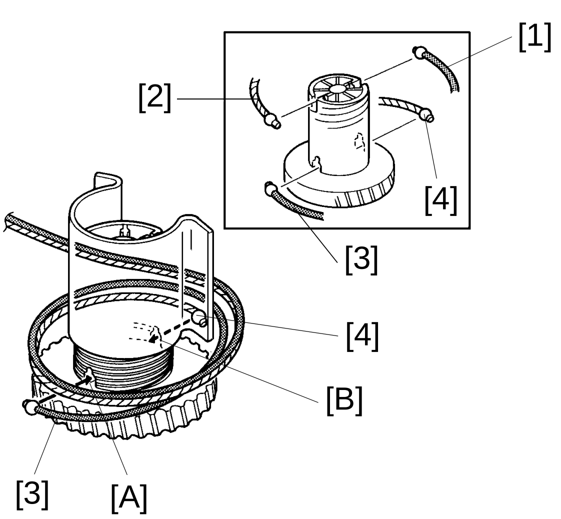
A173R519.img



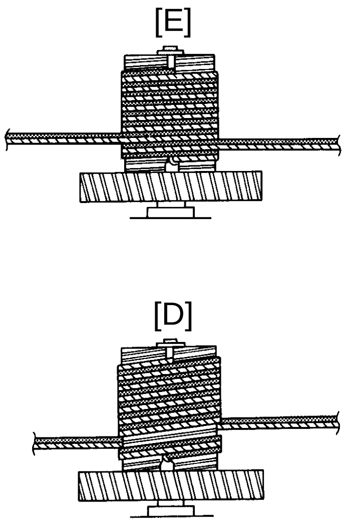
A173R520.img

1. Put the bead at the end of the blue wire [1] in slot [A].
2. Put the bead of the silver wire [2] in slot [B].
3. Wind the blue wire [1] clockwise halfway around the pulley. Wind the silver wire [2] clockwise one complete turn around the pulley.
4. Wind the blue and silver wires together five and a half times around the pulley. Make sure that the blue wire is wound six times and the silver wire is wound six and a half times in total.
5. Set an omega clamp [C] over the wires on the drive pulley [D] as shown.

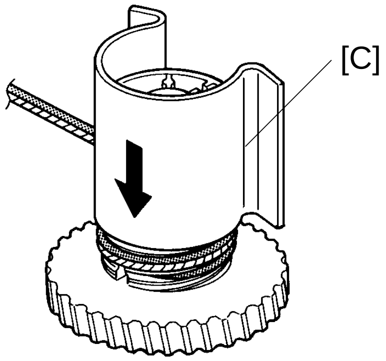
   NOTE: Leave enough space at the bottom for winding the other two wires (see the next page).



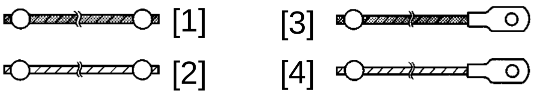
A173R521.img



A173R522.img



A173R523.img

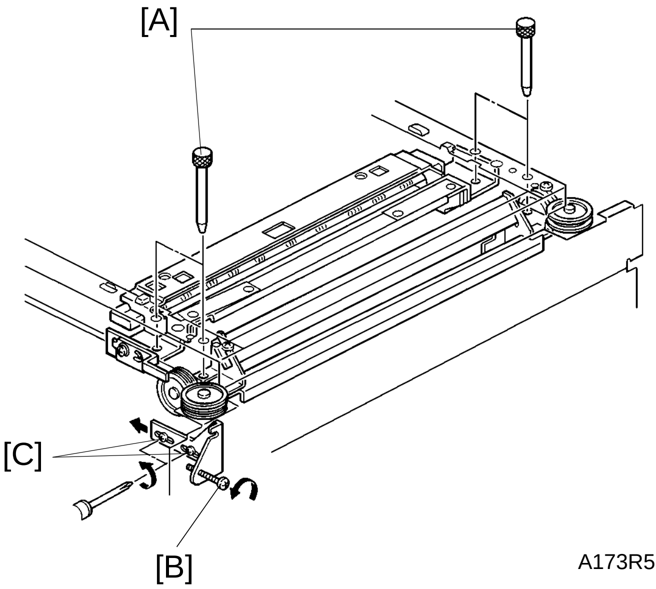


A173R520.img

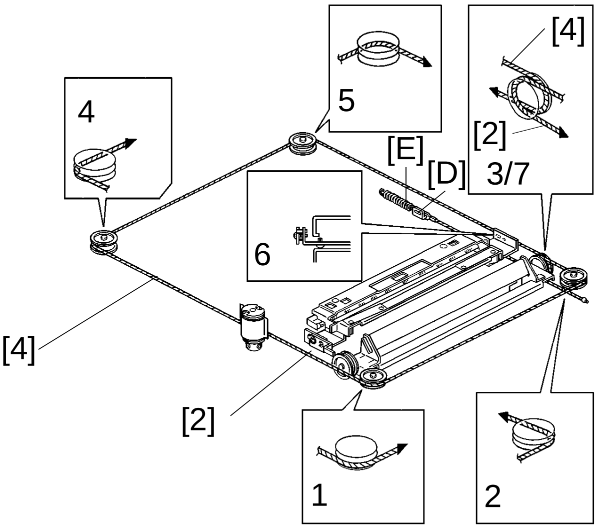
6. Put the bead of the blue wire [3] in slot [A] on the silver wire [2] side.
7. Put the bead of the silver wire [4] in slot [B] on the blue wire [1] side.
8. Wind the blue wire [3] clockwise one and a half times around the pulley. Wind the silver wire [4] once clockwise around the pulley.

   NOTE: a) The blue and silver wires must alternate on the pulley with the blue wire uppermost.
   b) Rear view [D]: Wires must not be wound around the two grooves shown in the illustration.
   c) Front view [E]: Wires must be wound around all the grooves shown in the illustration.

9. Slide the omega clamp [C] down to secure all the wires as shown.
10. Set the pulley on the drive shaft (1 E-ring).



A173R524.img



A173R525.img

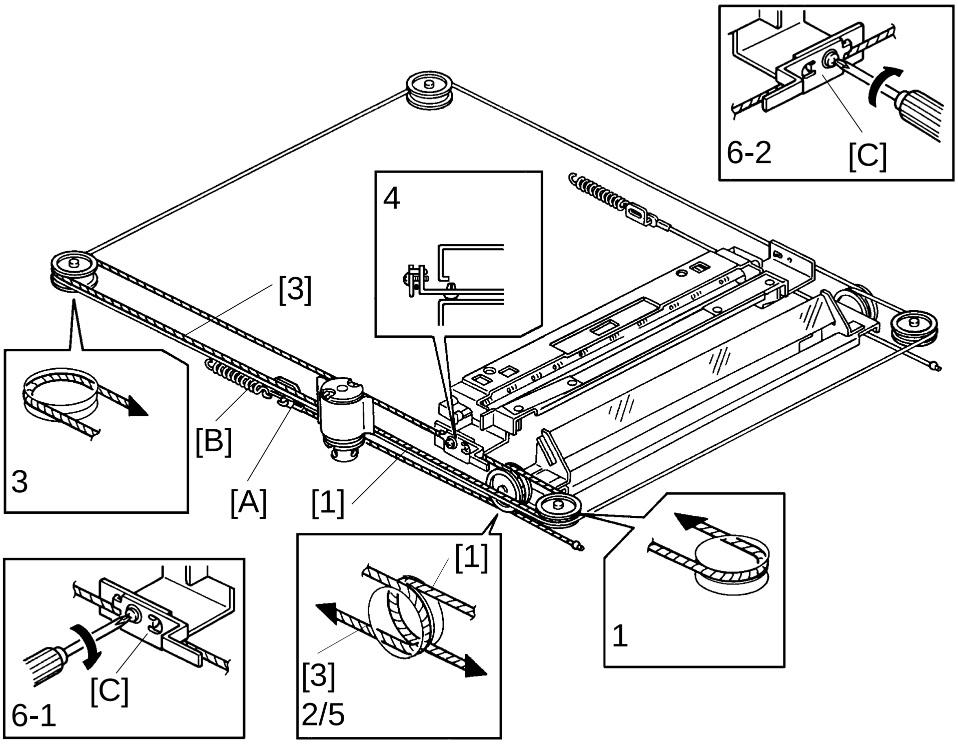
11. Manually move the first and second scanners to home position.

12. Insert the four positioning pins [A] in the holes in the scanner guide rails to secure the first and second scanners.

13. Loosen the wire tension bracket securing screw [B] and the wire tension adjusting screws [C].

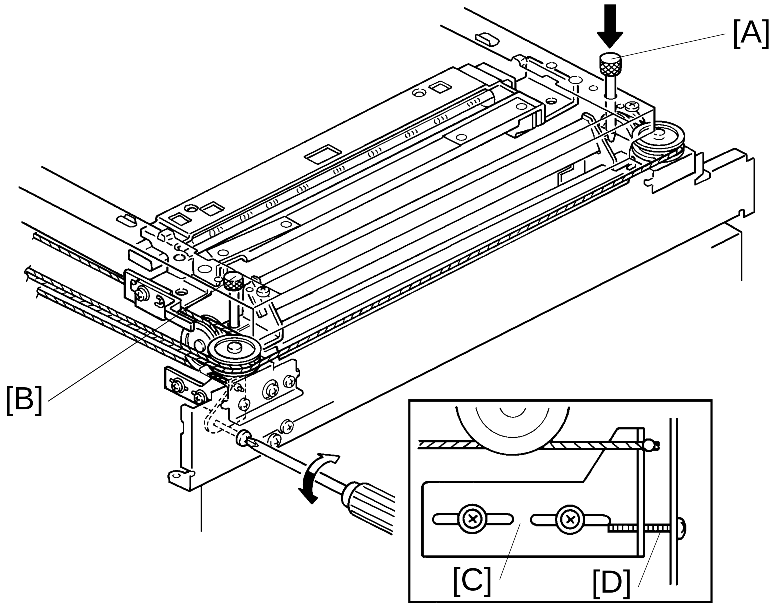
14. Loosen the screw that holds the front securing plate [D]. Route wires [2] and [4] around the pulleys as shown.

15. Hook the silver wire [4] onto the securing plate and hook the wire tension spring [E] onto the securing plate and the frame projection (see wire removal).

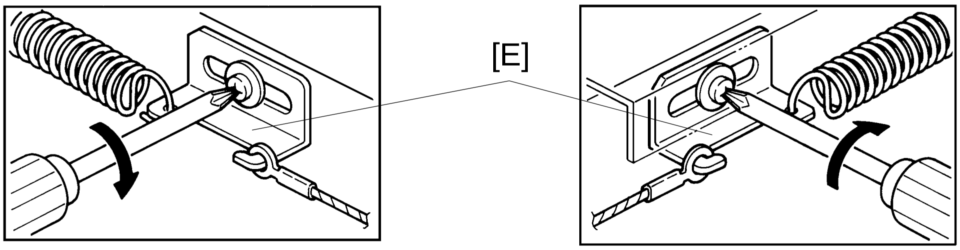


A173R526.img

16. Route blue wires [1 and 3] around the pulleys as shown.
17. Attach wire [3] to the wire securing plate [A], then hook one end of tension spring [B] to the plate and the other end to the frame projection.
18. Tighten the first scanner clamps [C] and remove the four positioning pins and the omega clamp.
19. Perform a free run (turn DIP switch 101-1 ON and press the Print key) for 10 minutes and make sure that the scanners operate smoothly.



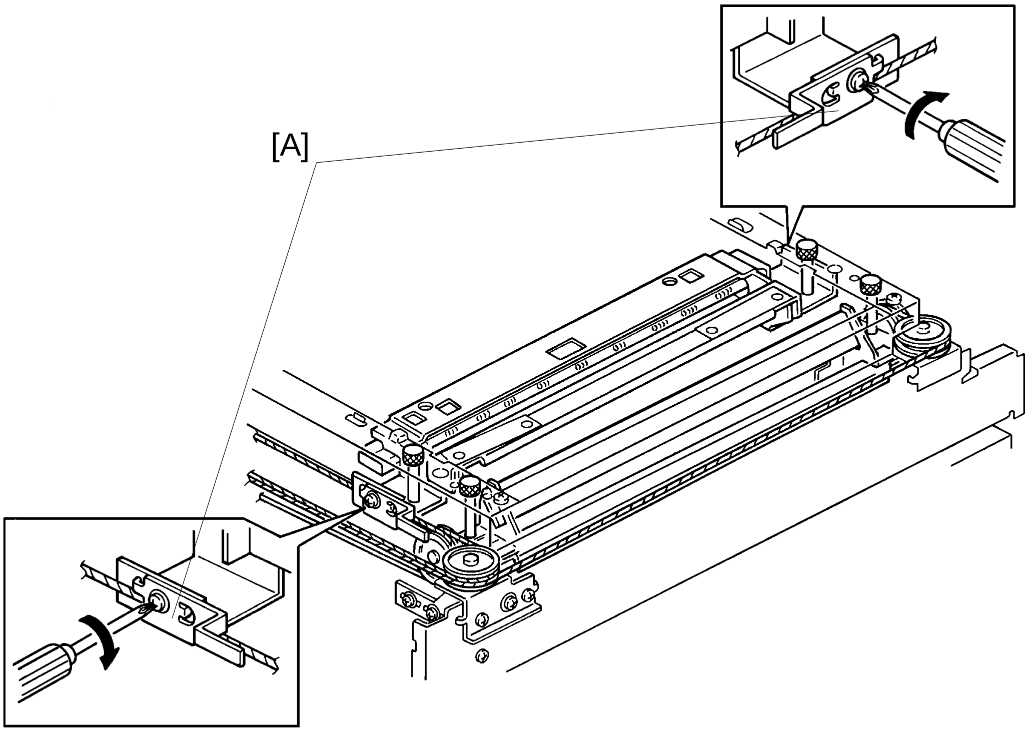
A173R527.img



A173R528.img

A173R529.img

20. Adjust the tension in the second scanner wire.
    1) Insert positioning pin [A] in the hole at the front end of the second scanner.
    2) Loosely insert positioning pin [B] in the hole at the rear end of the second scanner.
    3) Loosen the two screws securing the wire tension bracket [C], then turn the 2nd scanner positioning screw [D] clockwise until the rear positioning pin drops and locks in position.
    4) Tighten the two screws securing the wire tension bracket [C].
    5) Make sure the positioning pin [B] slides in and out smoothly. If not, repeat step 3).
    6) Tighten the screws that hold the front and rear wire securing plates [E].



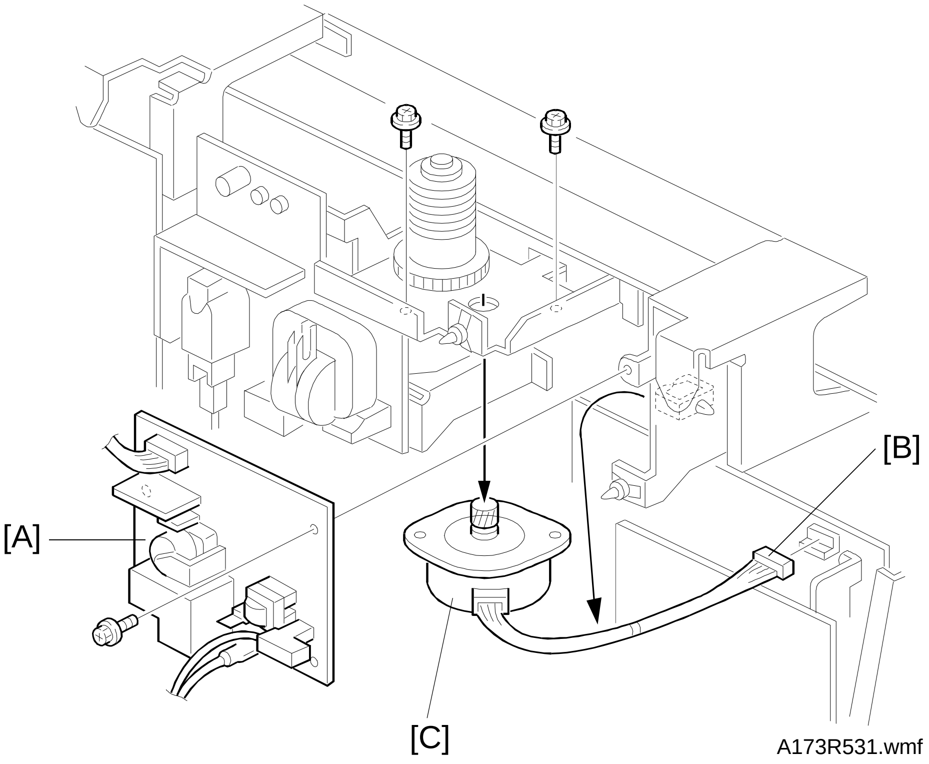
A173R530.img

21. Adjust the first scanner wire clamps.
    1) Loosen the front and rear first scanner wire clamps [A]
    2) Insert the front and rear positioning pins.
    3) Tighten the wire clamps.

22. Reassemble.

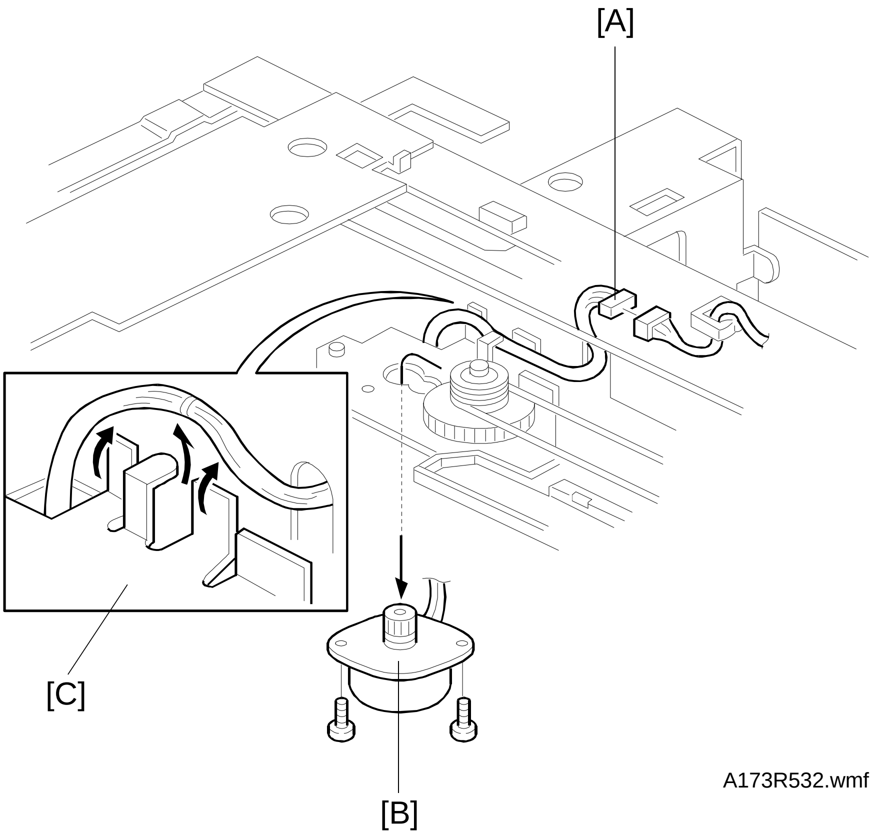
NOTE: Always adjust the first scanner wire clamps after adjusting the tension in the second scanner wire.

2.8 SCANNER MOTOR REPLACEMENT



1. Unplug the power cord.
2. Remove the rear cover and the upper cover.
3. Remove the CC/G/B power pack [A] (2 locking supports, 1 screw, and 4 connectors).
4. Disconnect the connector [B].
5. Remove the scanner motor [C] (2 screws).

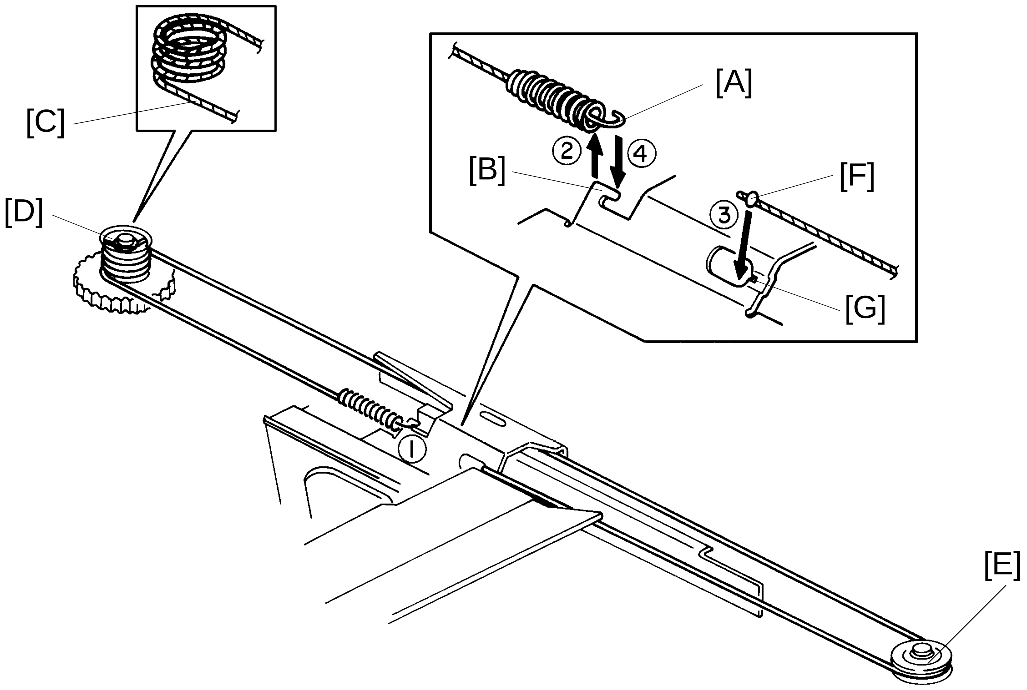
2.9 LENS MOTOR REPLACEMENT



1. Unplug the power cord.
2. Remove the rear cover and the left cover.
3. Remove the exposure glass.
4. Disconnect the lens motor 6P connector [A].
5. Remove the lens motor [B] (2 screws).

NOTE: When reinstalling the motor, route the harness as shown in the illustration [C].

2.10 LENS DRIVE WIRE INSTALLATION

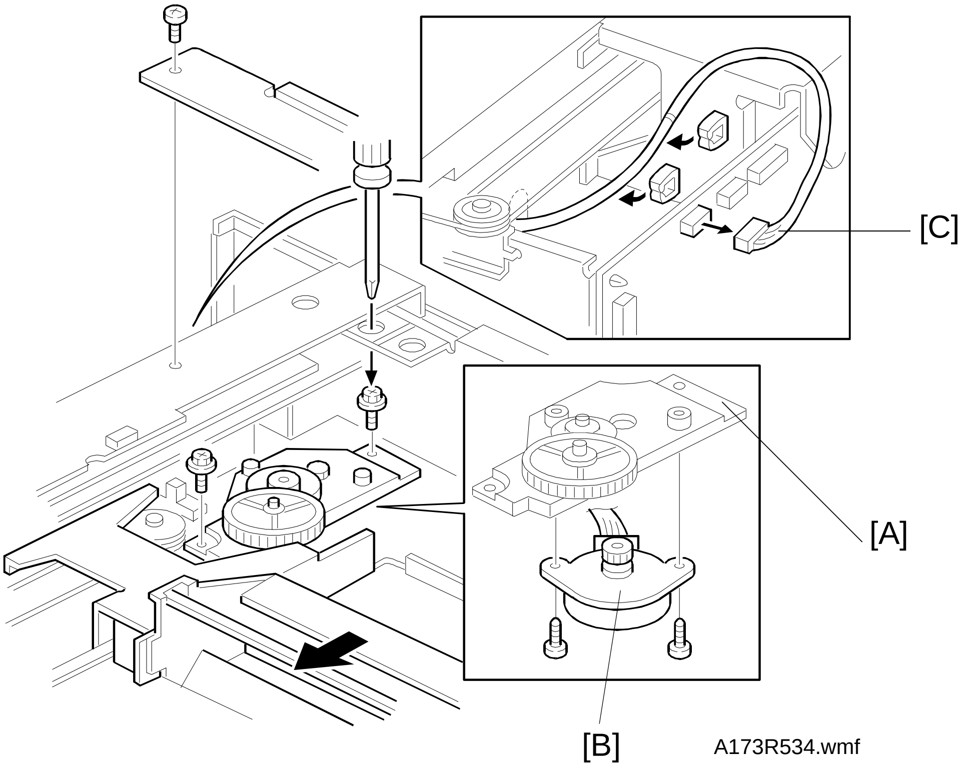


A173R533.img

1. Remove the exposure glass and the lens cover.
2. Remove the lens drive wire.
3. Hook the spring [A] onto the sensor actuator bracket [B].
4. Wind the lens drive wire [C] three and a half times around the pulley [D].
5. Wind the other end of the wire over the pulley [E].
6. Unhook the spring [A] (do not let go) and place the bead [F] at the other end of the wire in slot [G] on the sensor actuator bracket.
7. Reattach the spring to the bracket.

NOTE: Rotate the lens drive pulley and make sure that the lens drive wire moves smoothly.

2.11 4TH/5TH MIRROR MOTOR REPLACEMENT

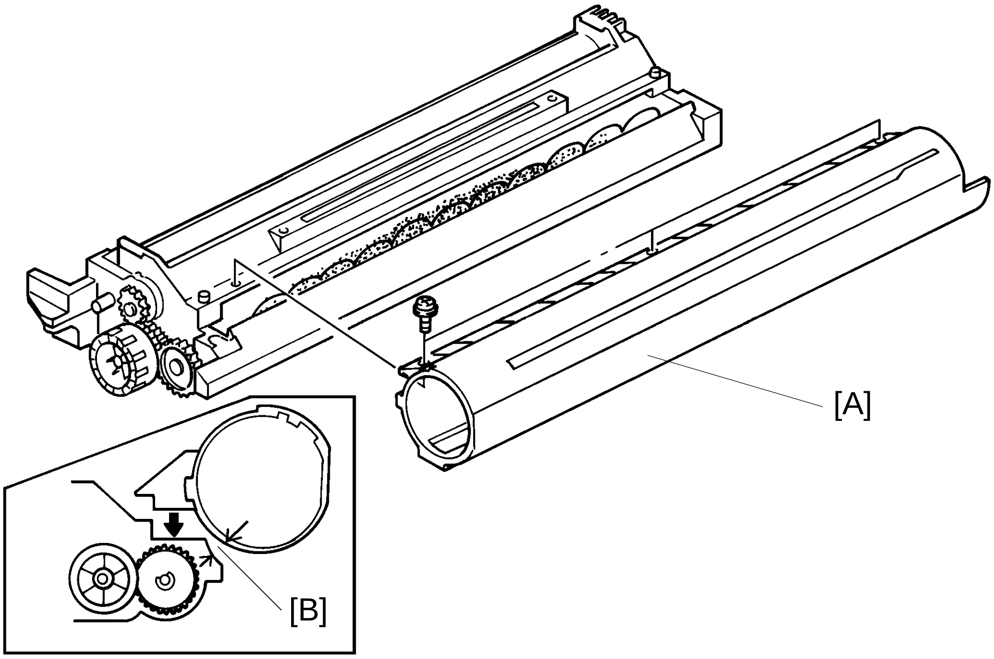


1. Unplug the power cord.
2. Remove the exposure glass, upper cover, lens cover, and rear cover.
3. Remove the main board.
4. Move the 4th/5th mirror assembly to the left (viewed from the front).
5. Remove the motor bracket [A] (2 screws).
6. Separate the 4th/5th mirror motor [B] from the bracket (2 screws) and replace it.

NOTE: Position the motor harness [C] as shown when installing a new motor.

3. DEVELOPMENT AND TONER SUPPLY

3.1 TONER SUPPLY UNIT REMOVAL

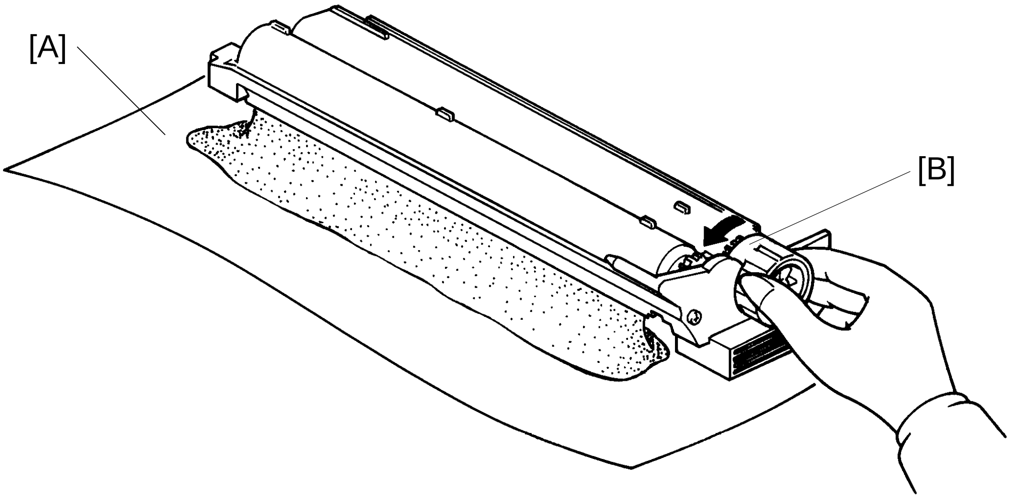


A173R535.img

1. Take out the development unit (1 snap ring).
2. Remove the toner supply unit [A] (3 screws).

NOTE: Make sure that there is no gap [B] between the toner supply unit and the development unit. (See the illustration.)

3.2 DEVELOPER REPLACEMENT

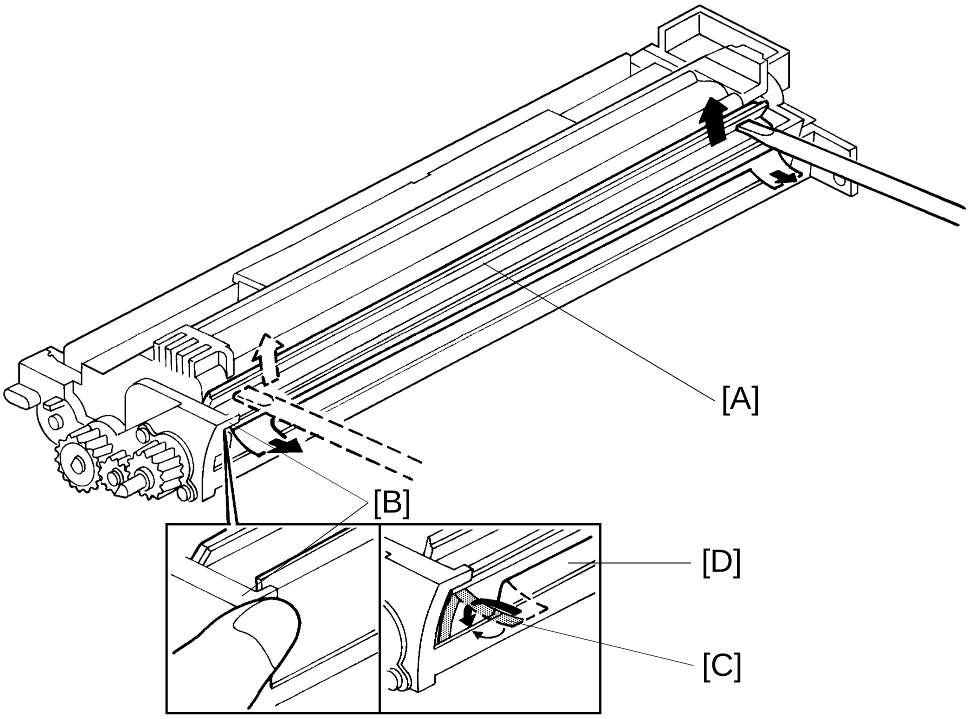


A173R536.img

1. Take out the development unit (1 snap ring).
2. Set the development unit on a large sheet of paper [A].
3. Remove the toner supply unit (3 screws). (See Toner Supply Unit Removal.)
4. Turn the paddle roller knob [B] counterclockwise to empty the old developer onto the paper.

   NOTE: Dispose of the used developer in accordance with local regulations.
5. Make sure that no developer remains on the development roller or in the development unit.
6. Pour one pack of developer into the development unit while turning the paddle roller knob.
7. Reinstall the toner tank and install the development unit in the machine.
8. Adjust Vsg using SP54.
9. Perform the initial setting procedure for new developer using SP65.

3.3 INLET SEAL REMOVAL

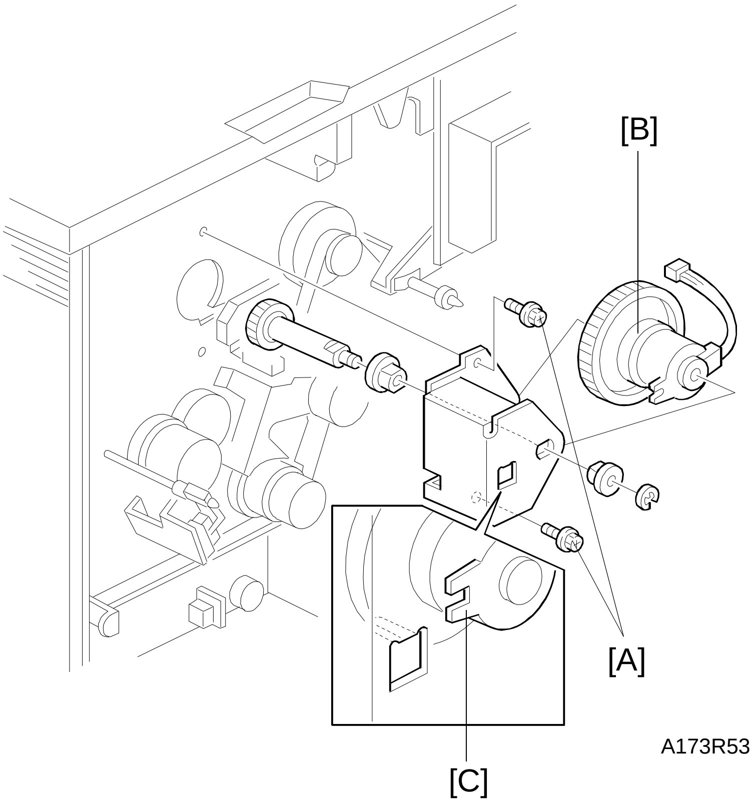


A173R537.img

1. Take out the development unit.
2. Remove the inlet seal plate [A] by working a small blade screwdriver along the edge of the plate while pressing the stoppers [B] with one finger as shown.

NOTE: a) Be careful not to damage the stoppers [B] when removing the inlet seal plate.
b) To install a new inlet seal plate, remove the covering from the two-sided tape [C] and attach the inlet seal [D] to the development unit lower casing. Tuck both ends of the seal inside the lower casing as shown.

3.4 TONER SUPPLY CLUTCH REPLACEMENT

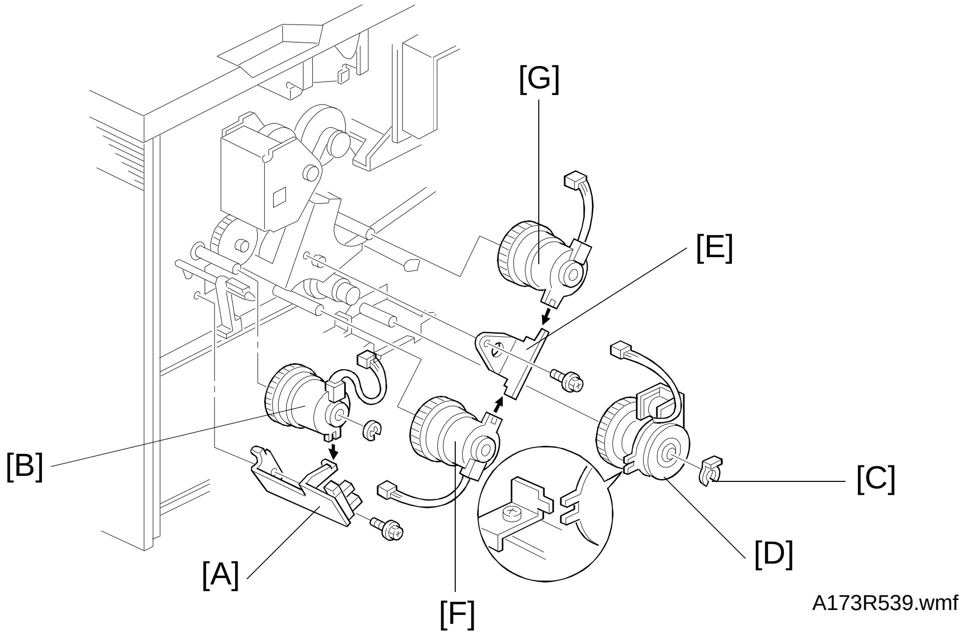


A173R538.wmf

1. Unplug the power cord.
2. Remove the rear cover (4 screws) and main board (2 screws, 3 locking support, and all connectors).
3. Remove the toner supply clutch bracket [A] (2 screws).
4. Replace the clutch [B] (1 E-ring and bushing).

NOTE: Make sure that the notch on the clutch engages with the stopper.

3.5 CLUTCH REMOVAL



Common Steps:

1. Unplug the power cord.
2. Remove the rear cover.
3. Remove the main board.

3.5.1 1st Paper Feed Clutch

4. Remove the paper end sensor bracket [A] (1 screw).
5. Remove the 1st paper feed clutch [B] (1 E-ring).

3.5.2 2nd Paper Feed Clutch

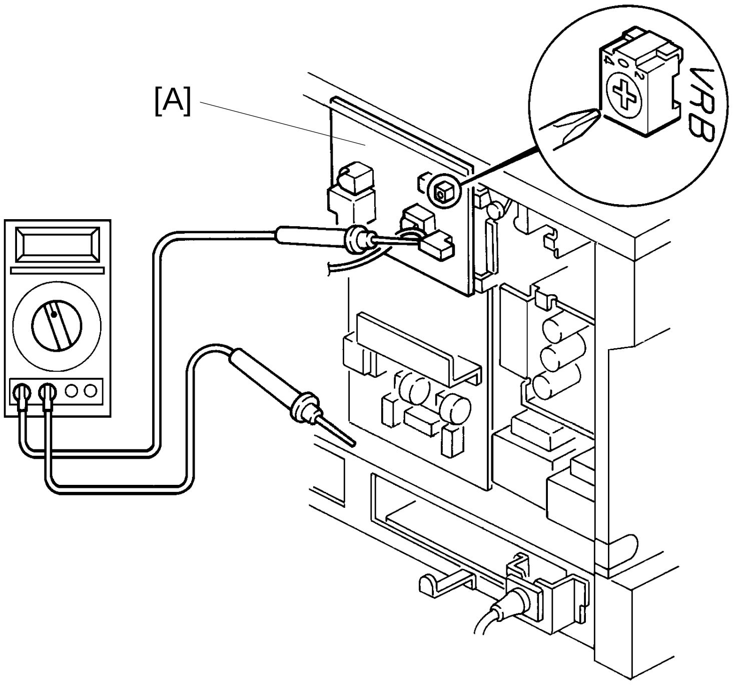
4. Remove the snap ring [C].
5. Remove the 2nd feed clutch [D].

3.5.3 Relay Roller Clutch/Registration Clutch

4. Remove the stopper bracket [E] (1 screw).
5. Remove the relay roller clutch [F] and the registration clutch [G].

NOTE: When reinstalling the clutches, make sure that the notch [H] is engaged with the stopper.

3.6 DEVELOPMENT BIAS VOLTAGE ADJUSTMENT (SP9-57)



A173R540.img

ADJUSTMENT STANDARD	Adjusting VR	
DC –400 ± 10 V	VRB	SP9-57

NOTE: VRB on the CC/Grid/Bias power pack spare parts is pre-adjusted. Usually it is not necessary to adjust VRB when the CC/Grid/Bias power pack is replaced.

1. Unplug the power cord and remove the rear cover (4 screws). Set the multimeter range to dc 1500 V and connect the multimeter leads as shown.

   NOTE: Keep the multimeter leads away from the main board.

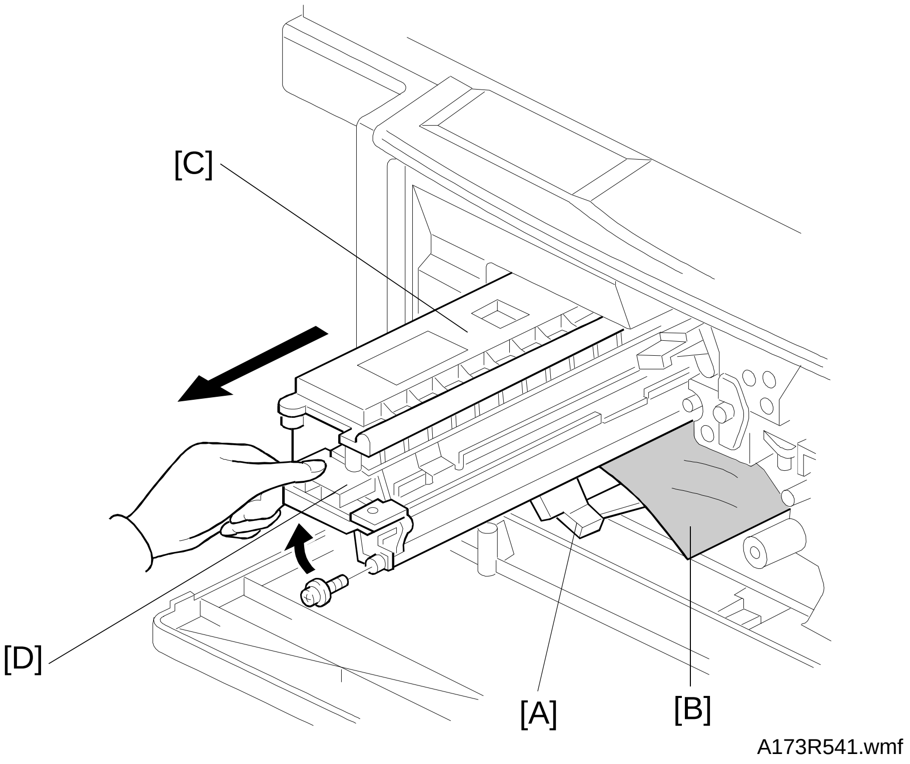
2. Plug the power cord in, turn on the main switch and apply development bias using SP9-57.

3. Adjust the development bias voltage to –400 ± 10 V by turning VRB on the CC/Grid/Bias power pack [A].

4. Press the C/⊙ key and turn off the main switch.

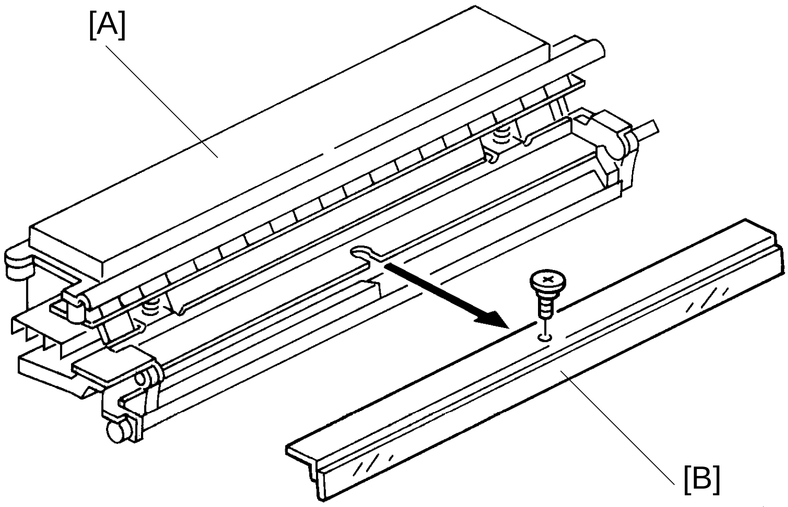
4. CLEANING

4.1 CLEANING UNIT REMOVAL



1. Open the front cover.
2. Lower the transport unit [A].
3. Place a sheet of paper [B] underneath the cleaning unit [C].
4. While holding down the cleaning blade release lever [D], remove the cleaning unit (1 screw).

4.2 CLEANING BLADE REPLACEMENT

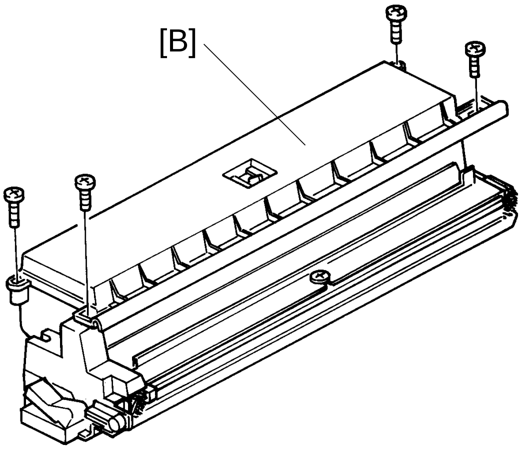


A173R542.img

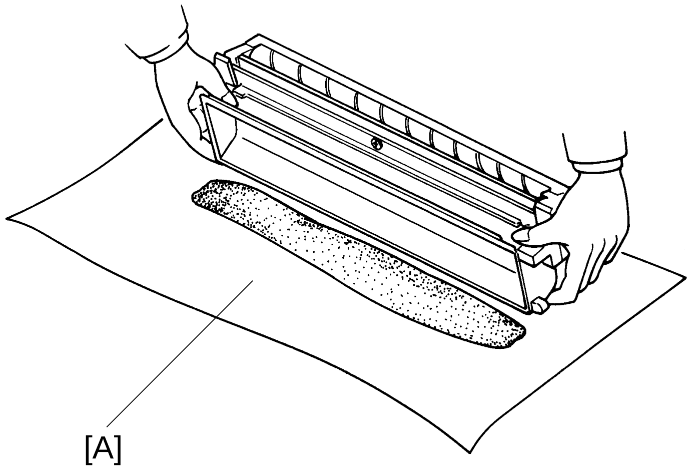
1. Remove the cleaning unit [A]. (See Cleaning Unit Removal.)
2. Remove the cleaning blade [B] (1 screw).

NOTE: a) Do not touch the edge of a new cleaning blade, as it is damaged easily.
b) After installing a new cleaning blade, be sure to apply setting powder evenly on the surface of the blade.
c) Make sure the new blade swivels correctly.
d) Apply setting powder on the edge of the cleaning blade.

4.3 USED TONER COLLECTION



A173R543.img

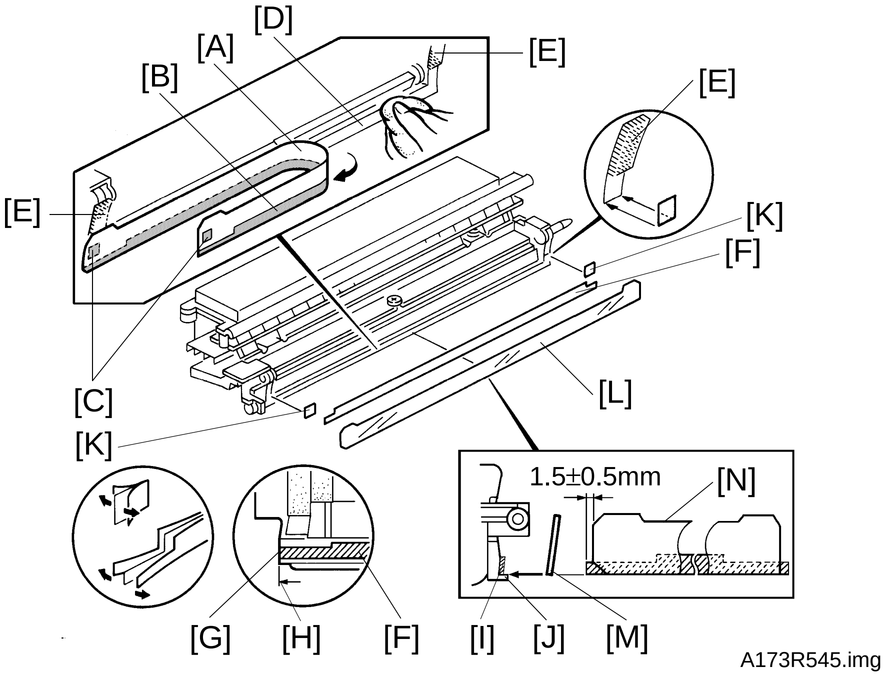


A173R544.img

1. Remove the cleaning unit. (See Cleaning Unit Removal.)
2. Set the cleaning unit on a large sheet of paper [A].
3. Remove the toner collection cover [B] (4 screws).
4. Pour the used toner slowly onto the paper sheet so that the toner does not scatter.
5. Place the paper sheet with the toner into a vinyl bag.

   NOTE: Dispose of the toner in accordance with local regulations.

4.4 ENTRANCE SEAL REPLACEMENT



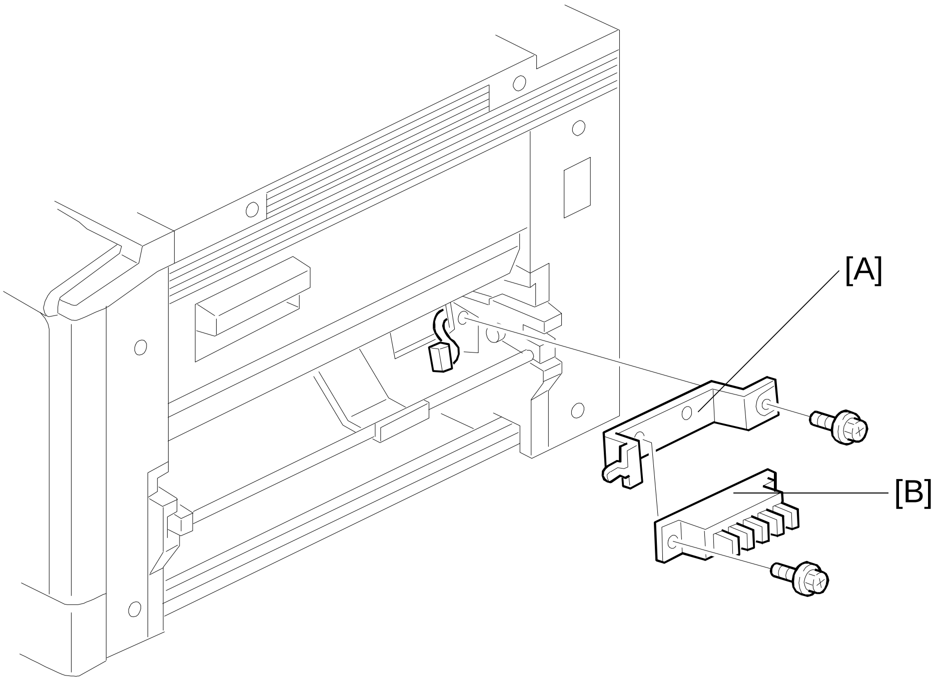
A173R545.img

1. Remove the cleaning unit and cleaning blade. (See Cleaning Blade Removal.)
2. Remove the used toner.
3. Clean the cleaning unit with a vacuum cleaner.
4. Remove the entrance seal [A] together with the strip of two-sided tape [B] and both of the two-sided seals [C] which secure the entrance seal [A] to the lower casing [D] and the side seals [E].
5. Clean the lower casing [D] with alcohol. Make sure that no tape remains on the casing surface and the side seals.
6. Place a new strip of two-sided tape [F] on the lower casing surface as shown in the illustration.
   The side edge [G] of the tape must be flush with the edge [H] of the lower casing and the lower edge [I] of the tape must be flush with the top of the projection [J] of the lower casing as shown in the illustration.
7. Place new strips of two-sided seals [K] on the side seals [E] at both sides.
8. Place the new entrance seal [L] on the two-sided tape [F] and the two-sided seals [K] as shown in the illustration.

   NOTE: a) The lower edge [M] of the entrance seal must be aligned with the edge [J] of the projection of the lower casing.
   b) Make sure that there are no waves in the upper edge [N] of the entrance seal.

5. PAPER FEED

5.1 1ST PAPER SIZE SWITCH REPLACEMENT

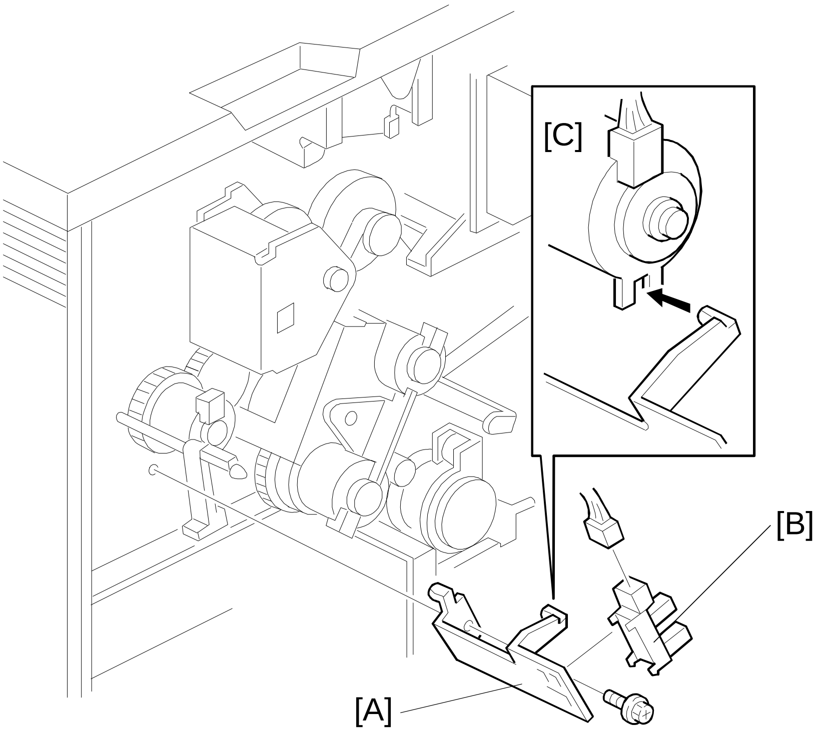


A173R546.wmf

1. Unplug the power cord.
2. Remove the paper size switch bracket [A] (1 screw).
3. Remove the paper size switch [B] (1 screw).
4. Pull the paper size switch out slightly and unhook the connector. Remove the paper size switch.

NOTE: After connecting the new switch to the connector, remove the slack in the switch harness by pulling on it from the rear side of the copier.

5.2 1ST PAPER END SENSOR REPLACEMENT

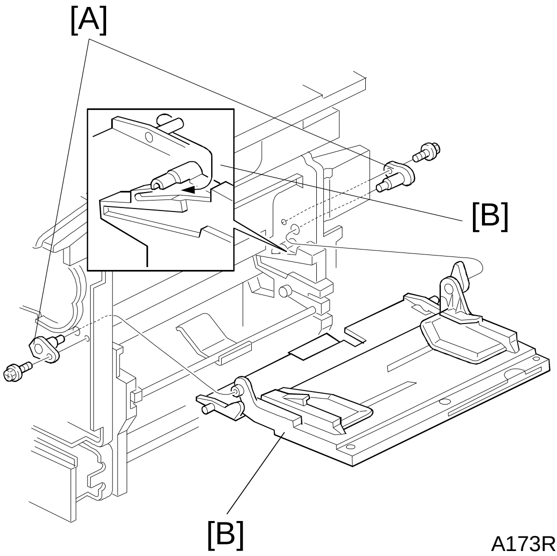


A173R547.wmf

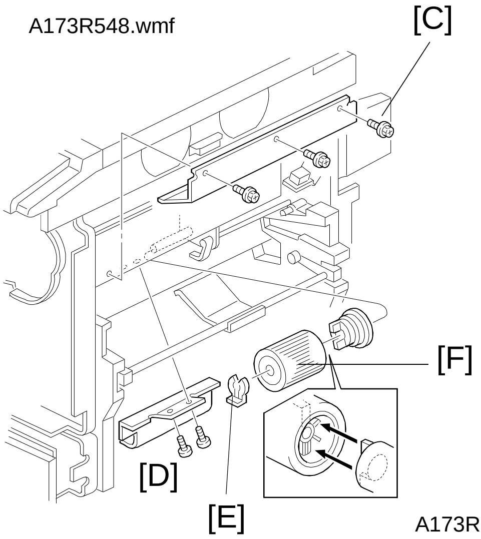
1. Unplug the power cord.
2. Remove the rear cover.
3. Remove the main board (2 screws and three locking supports).
4. Remove the sensor bracket [A] (1 screw) and remove the sensor [B] (1 connector).

NOTE: When reinstalling the sensor, make sure that the stopper on the bracket engages with the notch in the clutch [C].

5.3 PAPER FEED ROLLER REPLACEMENT



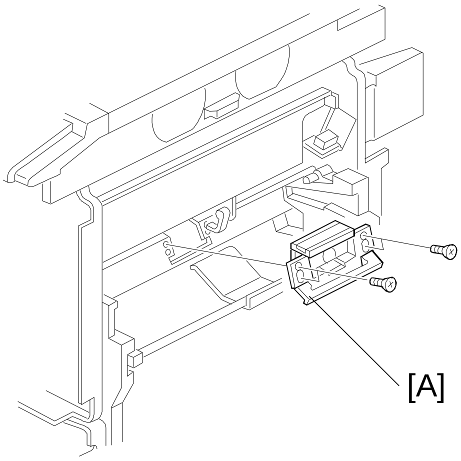
A173R548.wmf



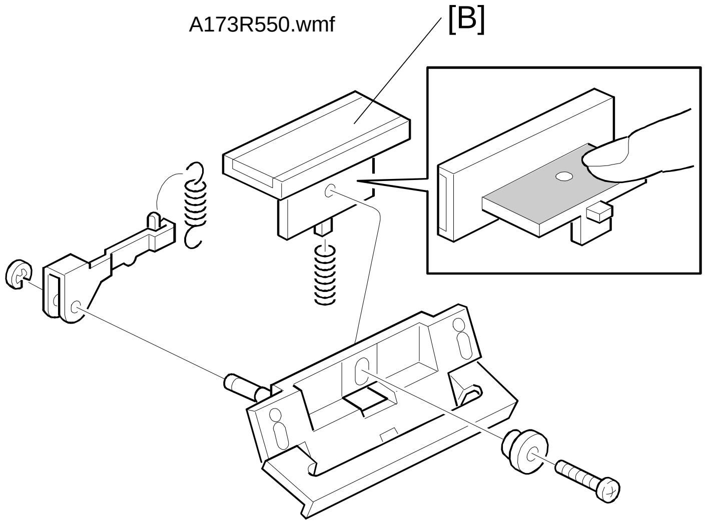
A173R549.wmf

1. Unplug the power cord.
2. Remove the right cover, front door, and rear cover.
3. Remove the main board.
4. Remove the front and rear brackets [A] holding the manual feed table [B].
5. Remove the manual feed table.
6. Remove the guide plate [C] (3 screws) and the bracket [D] (2 screws).
7. Replace the paper feed roller [F] (1 snap ring [E]).

5.4 FRICTION PAD REPLACEMENT



A173R550.wmf

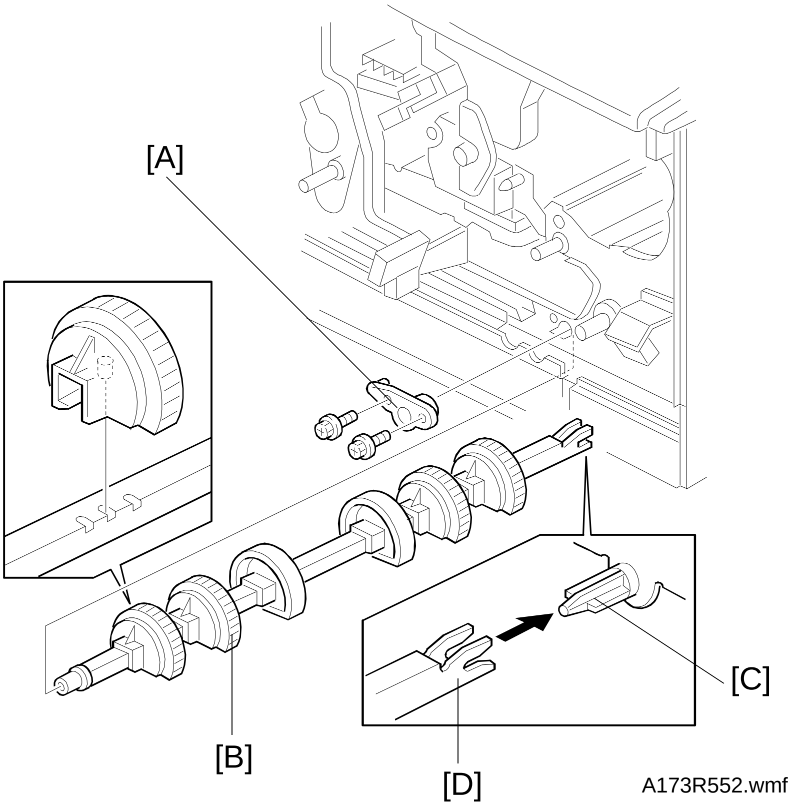


A173R551.wmf

1. Remove the cassette.
2. Remove the friction pad assembly [A] (4 screws).
3. Remove the friction pad [B] (1 screw).

NOTE: After reinstalling the friction pad, confirm that it moves up and down smoothly.

5.5 2ND PAPER FEED ROLLER REPLACEMENT



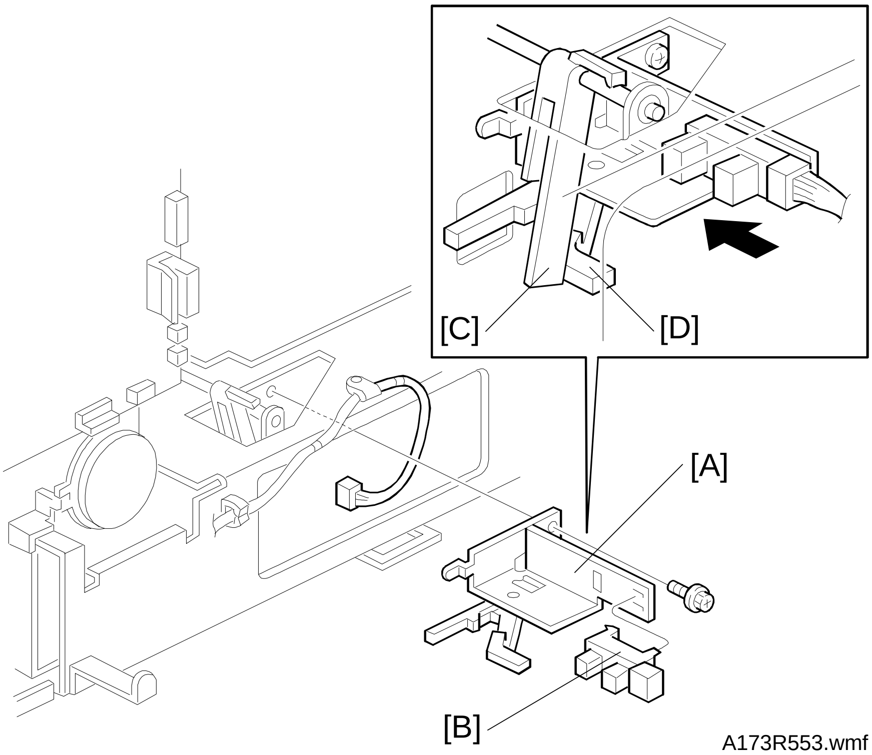
1. Unplug the power cord.
2. Remove the front door.
3. Pull out the paper tray.
4. Remove the bracket [A] (2 screws).
5. Replace the feed rollers [B] (1 screw each).

NOTE: When reinstalling the feed roller assembly, make sure of the following:

a) The feed rollers face up as shown.

b) The pins [C] on the end of the drive shaft fit into the slots [D] on the end of the feed roller shaft.

5.6 2ND PAPER END SENSOR REPLACEMENT

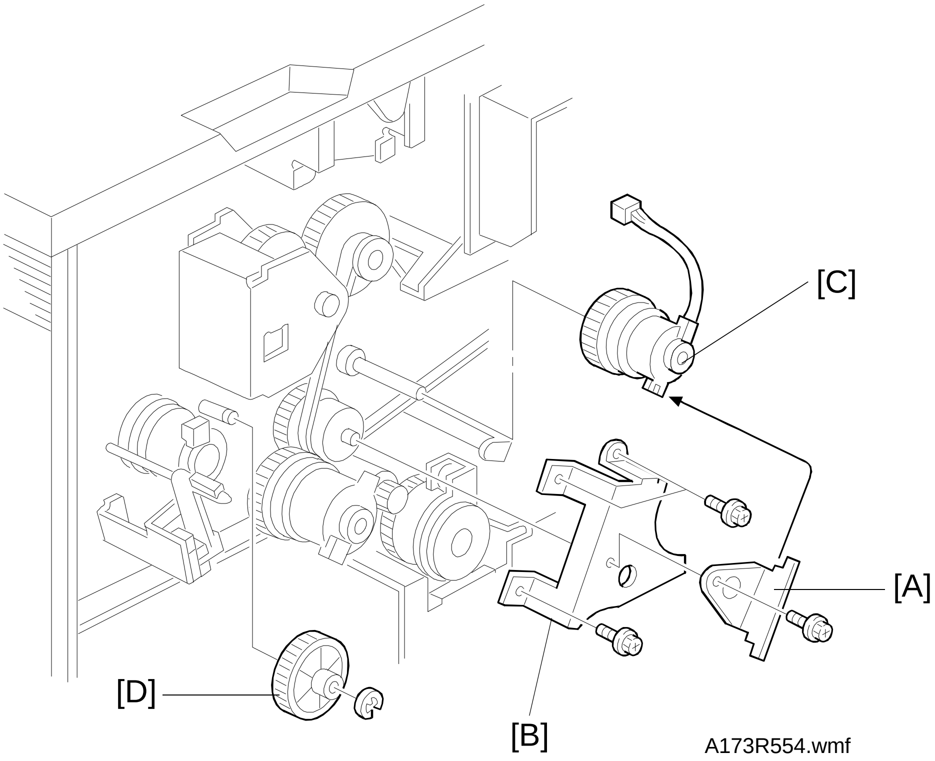


A173R553.wmf

1. Unplug the power cord.
2. Pull out the paper tray.
3. Remove the rear cover.
4. Remove the sensor bracket [A] (1 screw).
5. Replace the sensor [B] (1 connector).

NOTE: When reinstalling the sensor bracket, make sure that the paper end actuator [C] and paper end feeler release lever [D] are properly positioned as shown. If not, the feeler may be damaged when the paper tray is inserted.

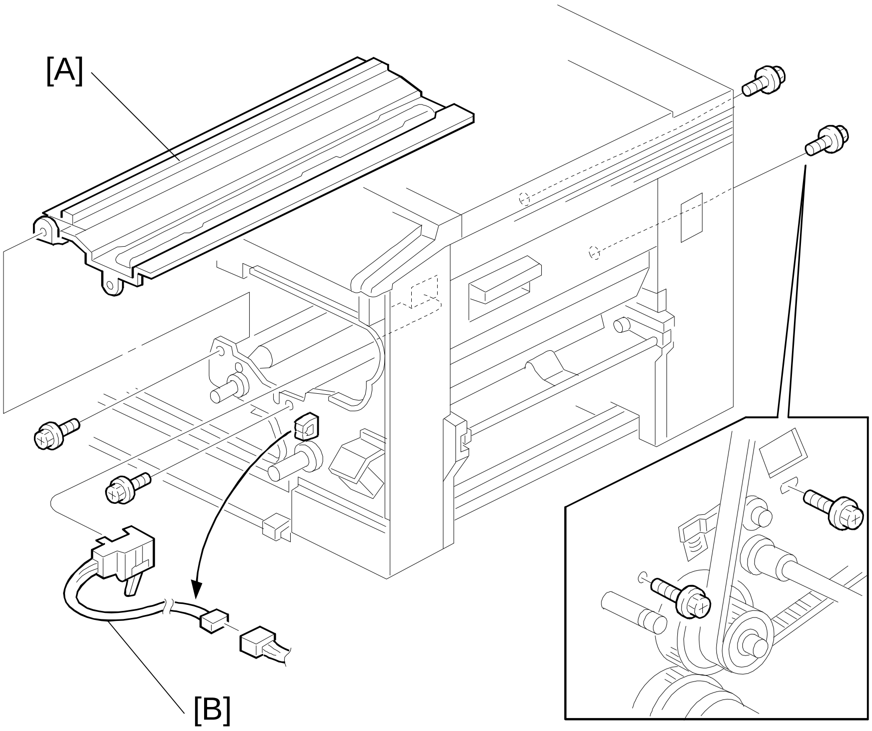
5.7 REGISTRATION SENSOR/REGISTRATION ROLLER REMOVAL



1. Unplug the power cord.
2. Remove the following parts:

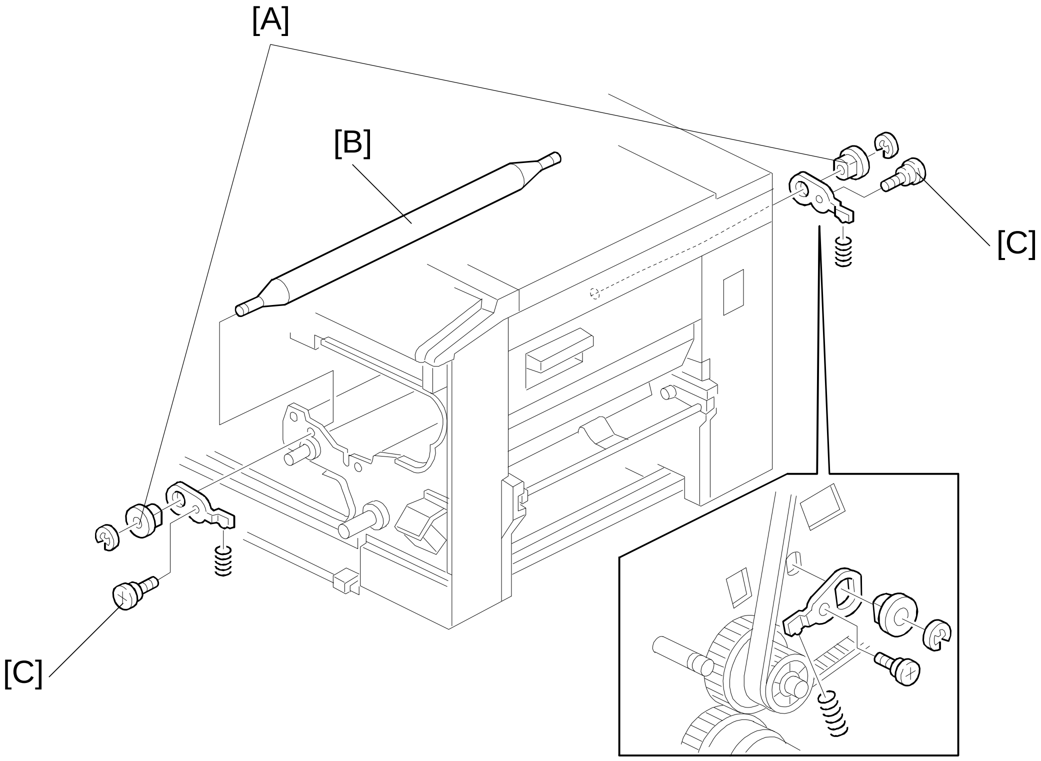
Front door	Rear cover
Development unit	Inner cover
CC/G/G power pack	Cleaning unit
Main board	

3. Remove the stopper [A] (1 screw) and the clutch cover [B] (3 screws).
4. Remove the registration clutch [C].
5. Remove the idle gear [D] (1 E-ring).



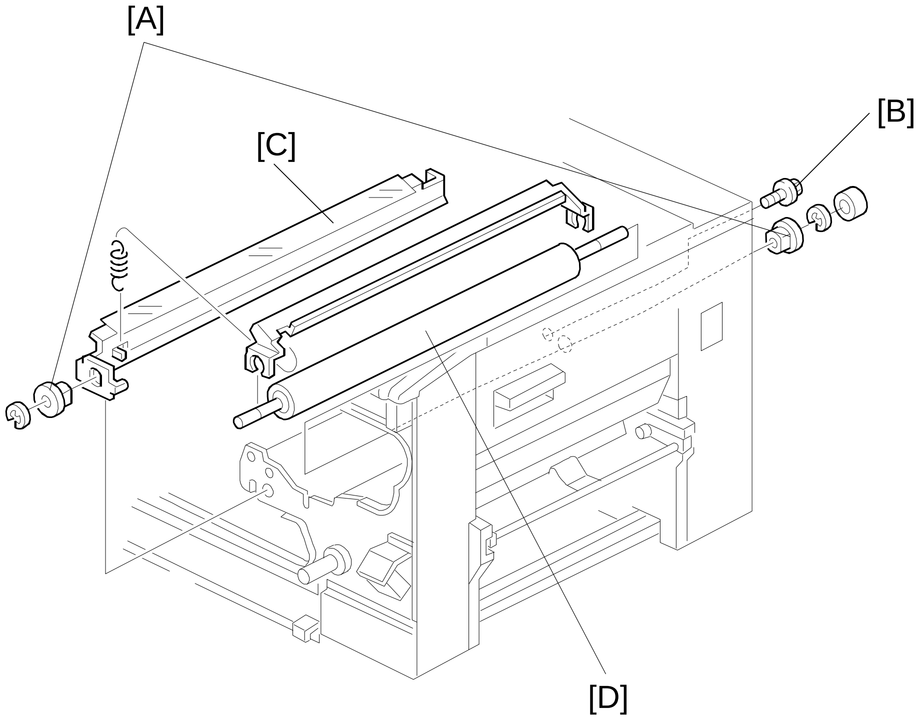
A173R555.wmf

6. Remove the guide plate [A] (4 screws).
7. Remove the registration sensor [B] (1 connector).



A173R556.wmf

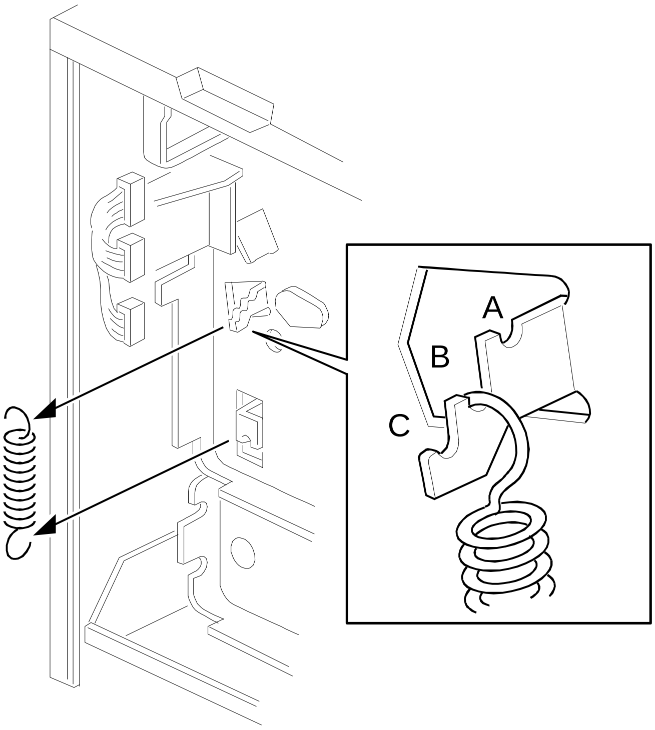
8. Remove the front and rear bushings [A] (1 E-ring each).
9. Remove the upper registration roller [B] (2 stepped screws [C]).



A173R557.wmf

10. Remove the front and rear bushings [A] of the lower registration roller (2 E-rings).
11. Remove the screw [B] securing the registration mylar bracket [C].
12. Remove the lower registration roller [D].

5.8 1ST PAPER FEED PRESSURE ADJUSTMENT



A173R558.wmf

NOTE: This adjustment should be done if paper multi-feed or no paper feeding frequently occurs.

1. Unplug the power cord.
2. Remove the rear cover (4 screws).
3. Remove the main board (2 screws and three locking supports).
4. Change the position of the spring hook depending on the type of misfeed.

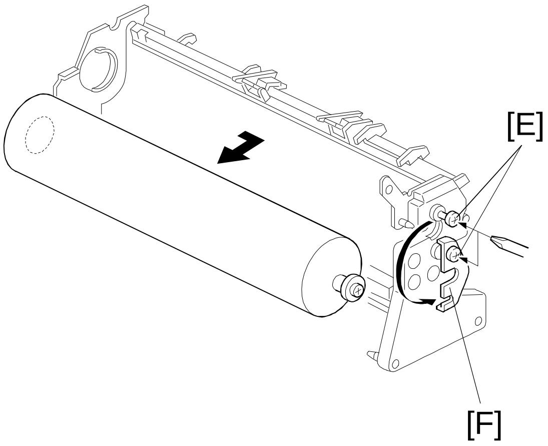
A: To counter no paper feeding (strong tension)

B: Normal position

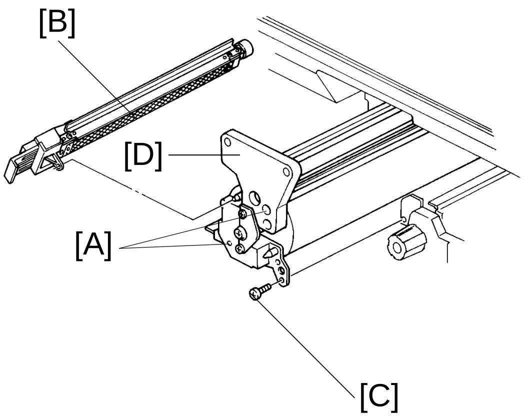
C: To counter paper multi-feeding (weak tension)

6. AROUND THE DRUM

6.1 DRUM REPLACEMENT



A173R559.wmf



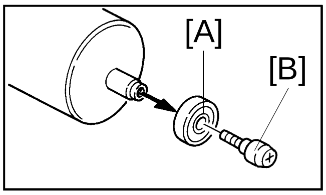
A173R560.img

IMPORTANT

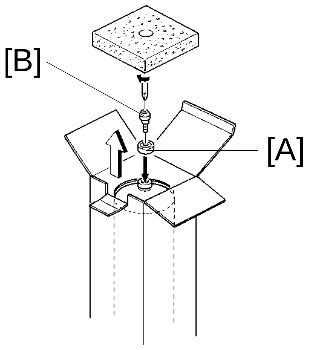
When replacing the drum, do not loosen the paint locked screws [A]. The drum position is set with a special tool and instruments at the factory to ensure the proper gap between the drum and the development unit.

1. Unplug the power cord, open the front door, and lower the transport unit.
2. Remove the following units:
    - Development unit
    - Cleaning unit
    - Charge corona unit [B] and wire cleaner
3. Remove the screw [C] securing the drum stay and pull out the drum unit [D] gently along the rail.
4. Place the drum unit on a sheet of paper. Loosen the two screws [E] securing the bearing holder [F] and rotate the holder as shown.
5. Remove the drum by holding the drum unit rail and pulling out and up on the drum knob.

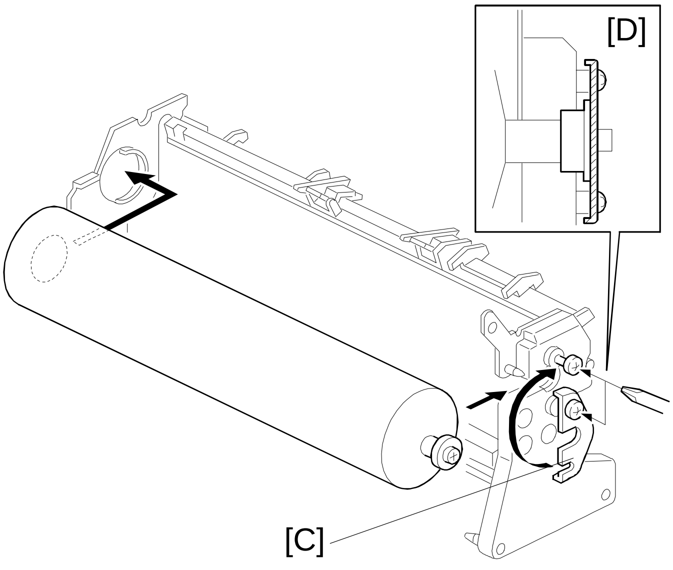
NOTE: a) When removing the drum, take care not to strike it against any objects.
b) Be careful not to bend the bearing holder [F].



A173R561.img



A173R562.img

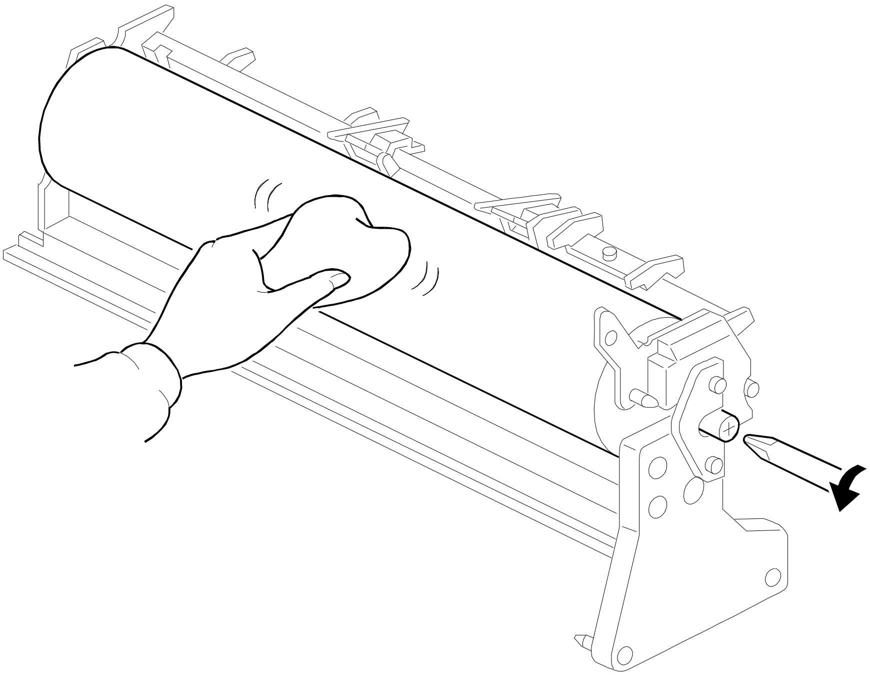


A173R563.wmf

6. Remove the bearing [A] (1 screw [B]) from the old drum and install it on the the new drum. Do not remove the protective sheet from the new drum yet.
7. Set the new drum in the unit and put the bearing holder [C] back in place. Tighten the screws.

   NOTE: a) When setting the drum in the unit, be careful not to strike it against the rail.
   b) Do not bend the bearing holder. Make sure the bearing holder is in contact with the bearing [D], as they are both used to ground the unit. If they are not in contact, solid black copies may occur.
   c) Do not touch the drum surface.

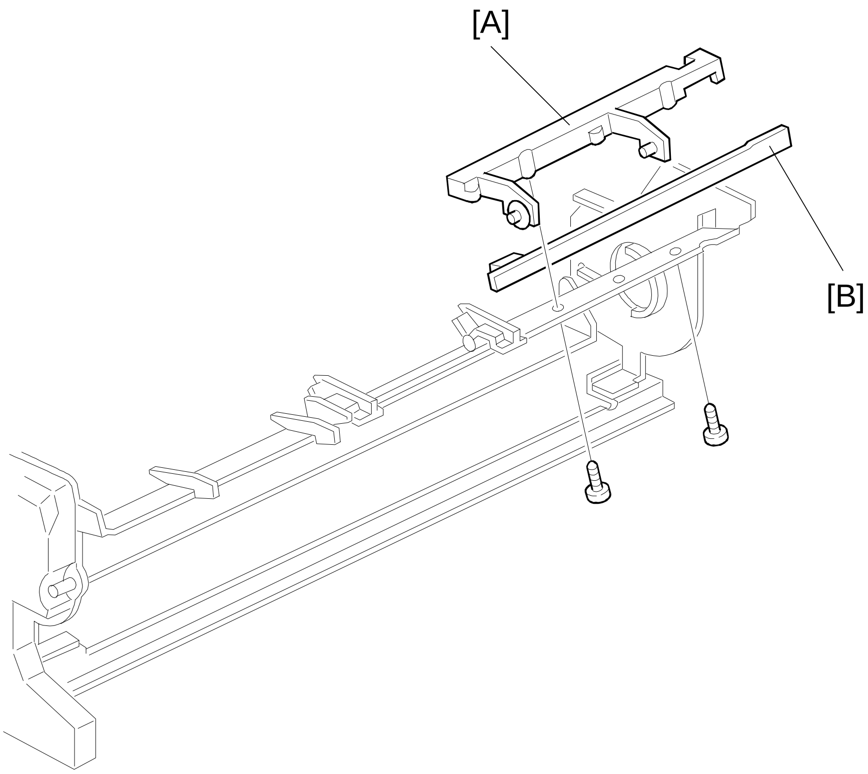
8. Set the drum unit in the machine and remove the drum protective sheet.
9. Reinstall the other units around the drum unit.
10. Reset the drum counter using SP66.
11. Perform the ID sensor (Vsg) adjustment using SP54.
12. Perform the light intensity adjustment using SP48. (See Light Intensity Adjustment.)
13. Perform the ADS adjustment using SP56.



A173R564.wmf

14. Apply setting powder all over the drum surface. (Turn the drum using a screwdriver.)

6.2 ID SENSOR REPLACEMENT



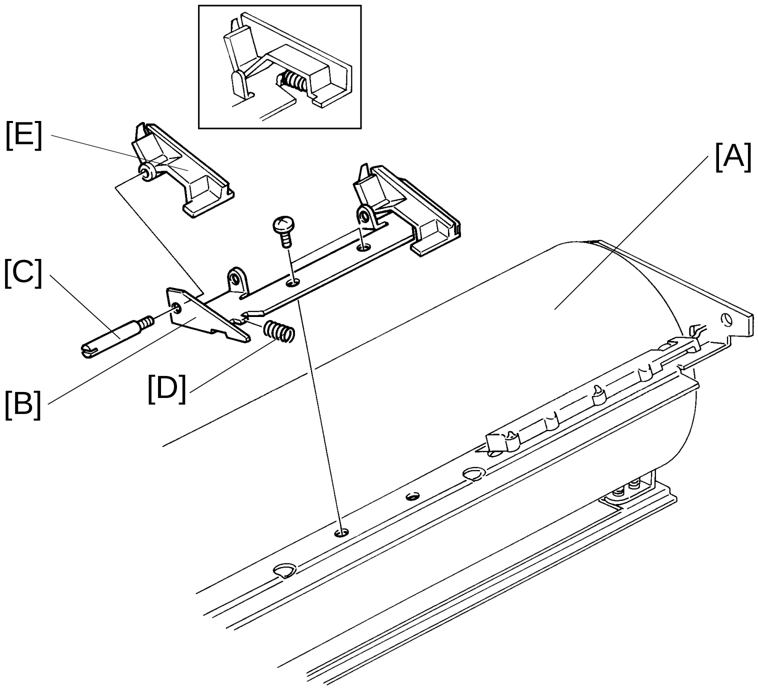
A173R565.wmf

1. Remove the drum unit, then remove the drum from the unit. (See Drum Replacement.)

   NOTE: Cover the drum with a sheet of paper to prevent the drum from being exposed to light.

2. Remove the ID sensor holder [A] (2 screws).
3. Replace the ID sensor board [B].
4. Perform the ID sensor (Vsg) adjustment (SP54).

6.3 PICK-OFF PAWL REPLACEMENT



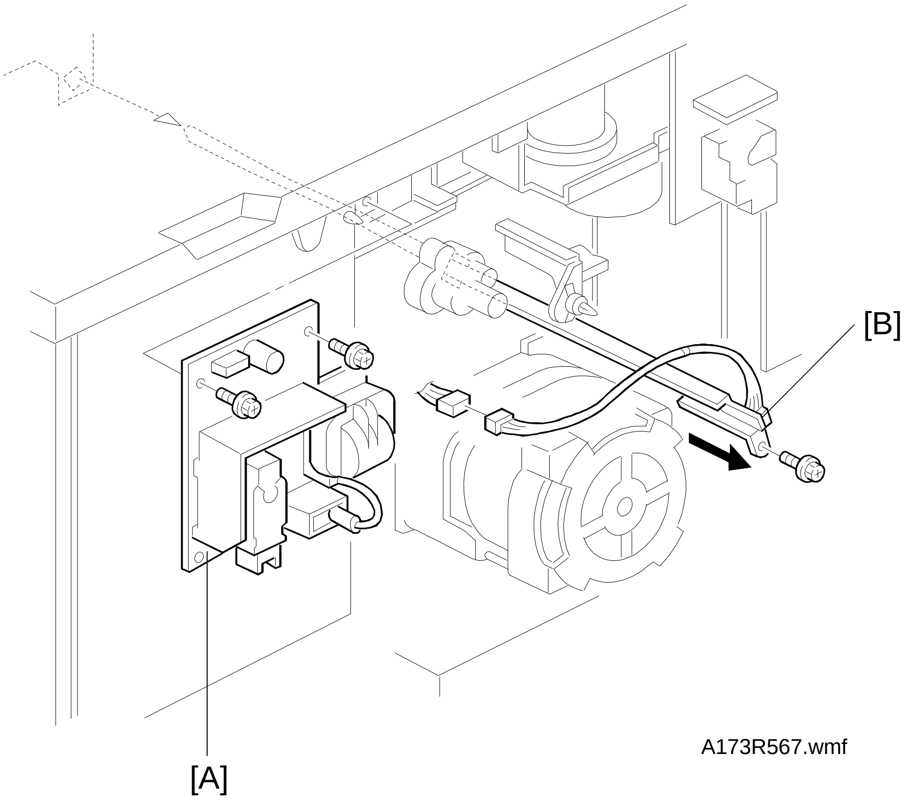
A173R566.img

NOTE: Cover the drum with a sheet of paper after removing it from the drum unit. This prevents the drum from being exposed to light.

1. Remove the drum unit, then separate the drum [A] from the unit. (See the Drum Replacement section.)
2. Remove the pick-off pawl bracket [B] (2 screws).
3. Remove the screws [C] and the springs [D], then replace the pick-off pawls [E].

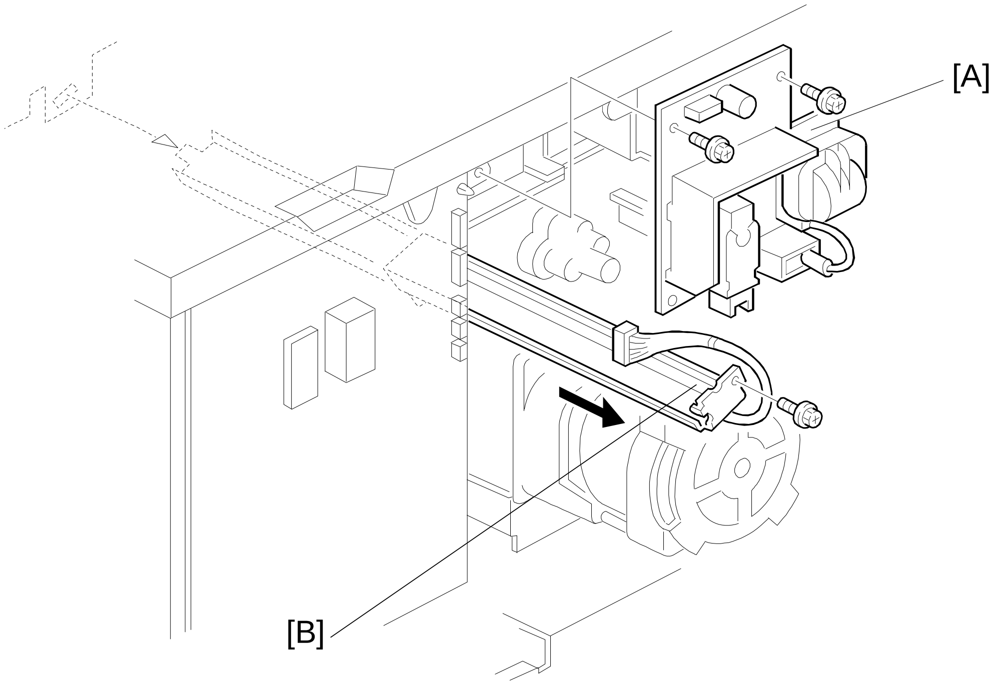
NOTE: When replacing the new pick-off pawls, make sure that the springs are positioned correctly as shown in the illustration.

6.4 QUENCHING LAMP REMOVAL



1. Remove the drum unit. (See Drum Replacement.)
2. Remove the rear cover.
3. Remove the TC/SC power pack [A] (2 screws and 2 locking supports).
4. Remove the quenching lamp [B] (1 screw).

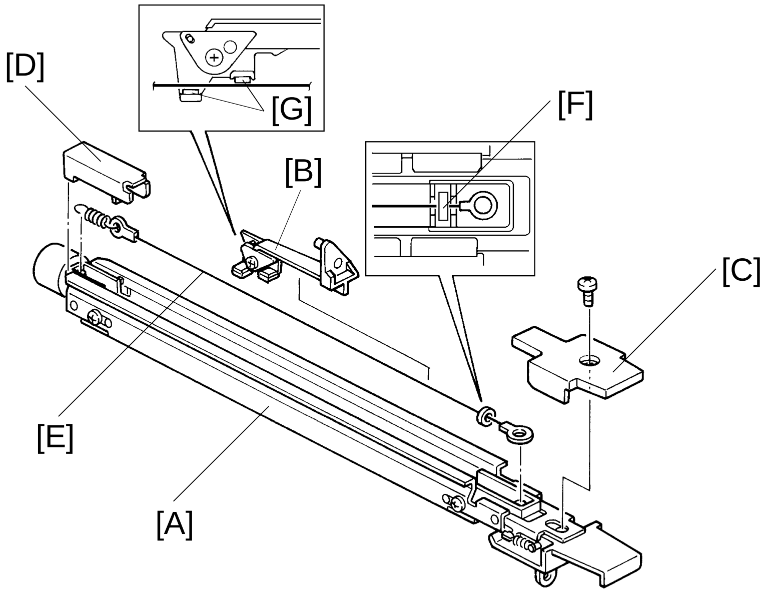
6.5 ERASE LAMP REMOVAL



A173R568.wmf

1. Unplug the power cord.
2. Open the front door.
3. Remove the drum unit. (See Drum Unit Removal.)
4. Remove the rear cover (4 screws).
5. Remove the TC/SC power pack [A] (2 screws).
6. Remove the erase lamp [B] (1 screw).

6.6 CHARGE CORONA WIRE REPLACEMENT

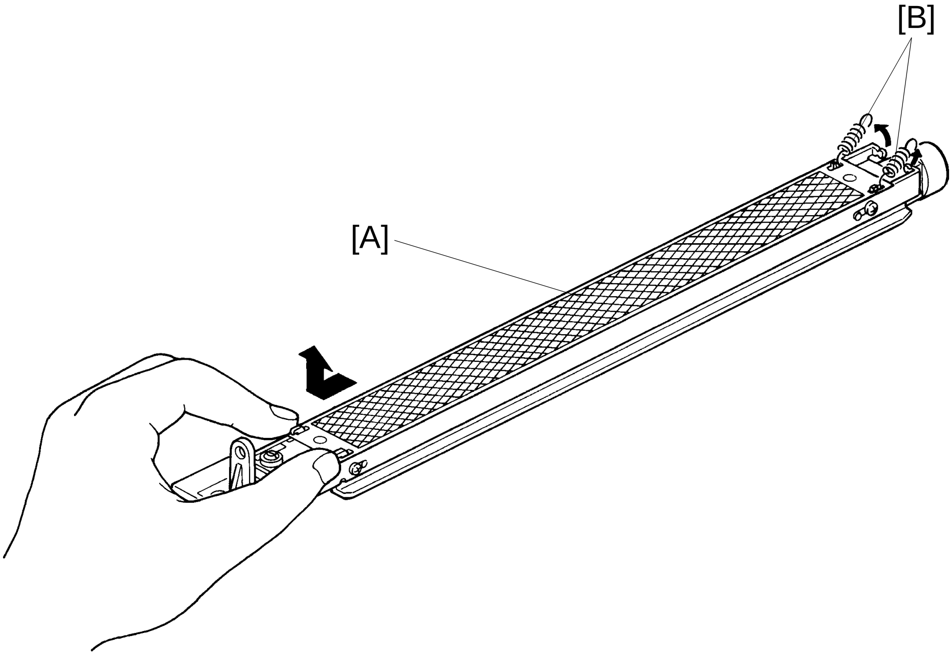


A173R569.img

1. Remove the charge corona unit [A] together with the wire cleaner [B] (1 screw).
2. Remove the wire cleaner from the charge corona unit.
3. Remove the front end block cover [C] (1 screw) and the rear end block cover [D].
4. Unhook the spring from the corona wire [E] and replace the wire.

NOTE: a) Make sure that the damper ring [F] is properly positioned as shown.
b) Do not handle the new corona wire with bare hands. Oil on the wire may cause uneven charge on the drum.
c) Do not rub the corona wires with rough material (sandpaper, etc.) as this will damage the corona wires.
d) When removing the end block covers, be careful not to break off the side hooks.
e) Do not use any solvents to clean the wires as this will cause uneven charge on the drum.
f) Do not damage the grid when replacing the charge wire.
g) When installing the charge corona unit, make sure that the wire is positioned between the cleaner pads [G].

6.7 CHARGE CORONA GRID REPLACEMENT

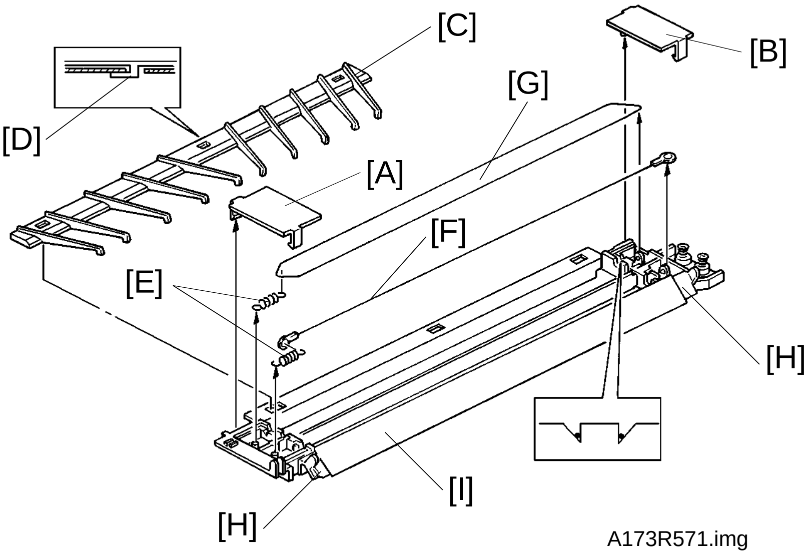


A173R570.img

1. Remove the charge corona unit.
2. Remove the grid plate [A] (2 springs [B]).

NOTE: a) Oils and chemicals from your hands will deteriorate the grid.
b) Do not bend the grid plate. This can result in an uneven charge.

6.8 TRANSFER/SEPARATION CORONA WIRE REPLACEMENT



1. Remove the transfer/separation (TC/SC) corona unit.
2. Remove the following parts:
   - TC/SC unit front end block cover [A]
   - TC/SC unit rear end block cover [B]
   - TC/SC unit paper guide [C].

   NOTE: When reinstalling the TC/SC unit paper guide, verify that all three tabs [D] are properly latched in place.

3. Unhook the springs [E] from the wires.
4. Replace the transfer corona wire [F] and the separation corona wire [G].

NOTE: a) When installing the separation corona wire, make sure that the wire junction is positioned inside the rear endblock.

b) The transfer and separation corona wires must be in the grooves of the front and rear endblocks.

c) Do not handle new corona wire with bare hands. Oil on the wire may cause an uneven charge on the drum.

d) Rubbing the corona wires with a rough material (sandpaper, etc.) will damage the corona wires.

e) When removing the end block covers, be careful not to break off the side hooks.

f) Do not use any solvents to clean the wires as this will cause uneven charge on the drum.

g) Do not loosen the two screws [H] for the transfer entrance guide [I]. This is because that the transfer entrance guide is positioned with a special tool at the factory.

6.9 CORONA CURRENT ADJUSTMENT

NOTE: The corona current varies with environmental conditions such as humidity and atmospheric pressure. The corona current is adjusted at the factory and is suitable for a wide range of environmental conditions. Corona current adjustment is necessary whenever the power packs are replaced; adjustment may also be necessary to correct problems with paper separation, toner transfer, or image density.

⚠ CAUTION

1. Make sure that SP9 is cleared before you change the range on the digital multimeter. If not, the multimeter may be damaged.

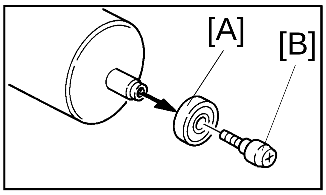
2. High voltage is applied to the corona wires. Be careful.

– Preparation –

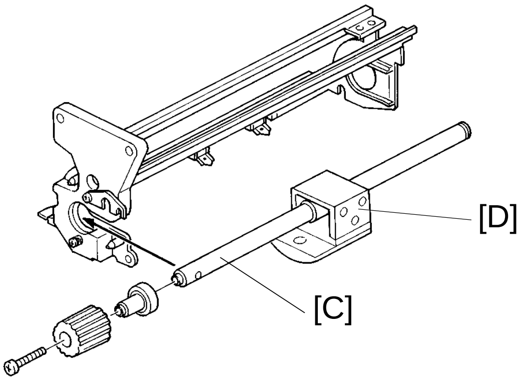
1. Unplug the power cord and remove the following parts:
    - Development Unit
    - Cleaning Unit
    - Charge Corona Unit
    - TC/SC Corona Unit
    - Drum Unit

2. Clean or replace each corona wire and clean the corona units with water or alcohol.

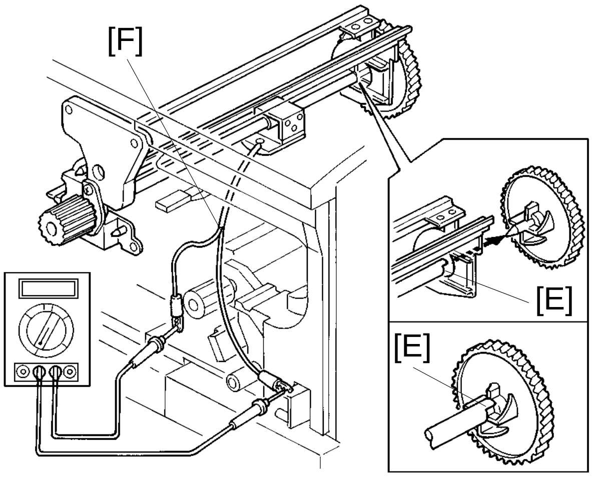
3. Remove the rear cover (4 screws).



A173R572.img



A173R573.img



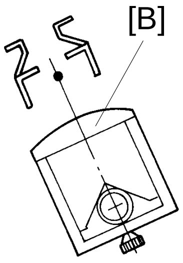
A173R574.img

NOTE: Do steps 5 – 9 before adjusting the transfer corona current, separation corona current or charge wire height:

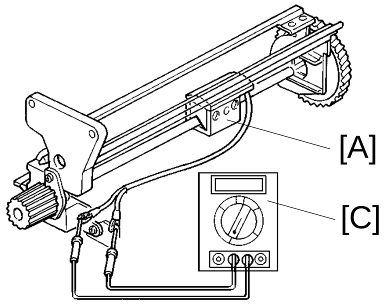
4. Remove the drum from the drum unit. Cover the drum with a shielding sleeve. (See Drum Replacement.)
5. Remove the bearing [A] (1 screw [B]) from the drum, then install it on the drum shaft [C] (special tool: P/N A0069105).
6. Set the drum shaft and drum shoe [D] on the drum unit as shown.

   NOTE: Be careful not to injure your hand on the edge of the pick-off pawls.
7. Reinstall the drum unit with the shaft rear end [E] positioned as shown in the illustration. Pass the harness [F] down into the development unit.
8. Connect the negative harness lead to the copier frame, then connect both multimeter leads as shown to the harness leads.

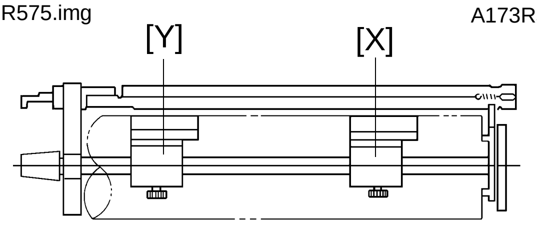
6.9.1 CHARGE CORONA CURRENT ADJUSTMENT (SP9-2)



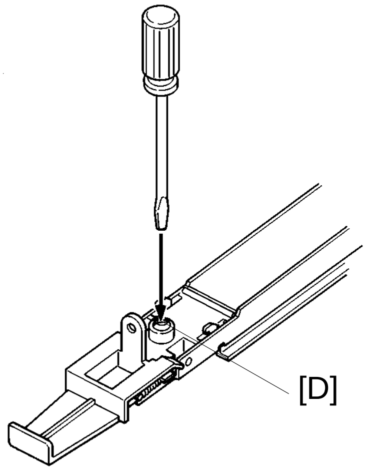
A173R575.img



A173R576.img



A173R578.img

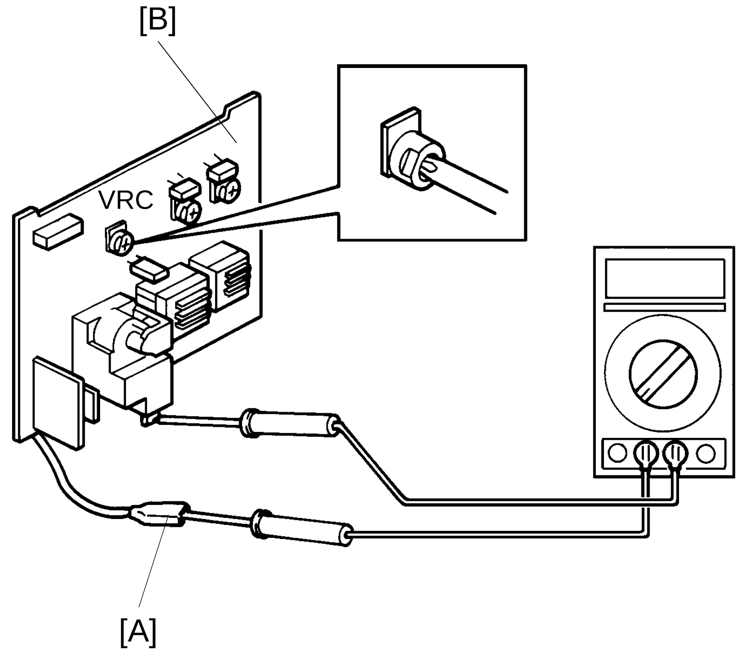


A173R577.img

– Wire Height Adjustment –

NOTE: If the OS-A3 test chart gray scale shows an uneven image, first do the Uneven Exposure Adjustment. If this fails, then check and adjust the wire height as follows:

1. Set the drum shaft and drum shoe on the drum unit and install the drum unit in the machine. (See Corona Current Adjustment Preparation.)
2. Slide the the drum shoe [A] to the rear limit [X] as shown.
3. Reinstall the charge corona unit on the drum unit.
4. Position the drum shoe so that the axis of the current detection plate [B] is aligned with the charge corona wire as shown.
5. Select the dc 200 µA range on the digital multimeter [C].
6. Using SP9–2, turn on the main switch, front door safety switch, and the charge corona .
7. Note the reading. (Wait at least 30 seconds for the current to stabilize.)
8. Press the C/◎ key to turn off the charge corona, then move the drum shoe to the front limit [Y] as shown and repeat steps 3 to 7.
9. Adjust the front corona wire height by turning the adjusting screw [D] if the two readings are different.
10. Repeat steps 2 to 9 until the difference between the front and rear readings is no more than 5%.



A173R579.img

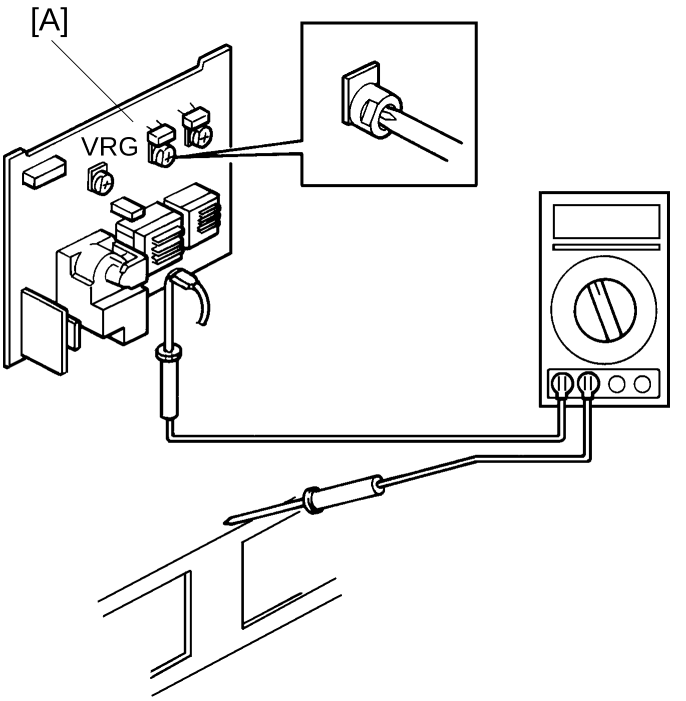
– Charge Corona Current Adjustment –

ADJUSTMENT STANDARD	Adjusting VR	
DC –370 ± 2 µA	VRC	SP9-2

NOTE: Keep the high voltage wire terminal [A] away from the copier frame. Otherwise, electrical leakage may interfere with current measurement.

1. Unplug the power cord.
2. Disconnect the charge corona terminal [A] from the CC/G/B power pack [B].
3. Select the dc 2mA range on the digital multimeter.
4. Connect the multimeter leads as shown, then measure the charge corona current.
5. Plug the power cord in, turn on the main switch, front door safety switch and the charge corona using SP9-2.
6. Adjust the charge corona current to –370 ± 2 µA by turning VRC on the CC/G/B power pack [B].
7. Press the C/⊚ key and turn the main switch off.

6.9.2 GRID VOLTAGE ADJUSTMENT (SP9-2)

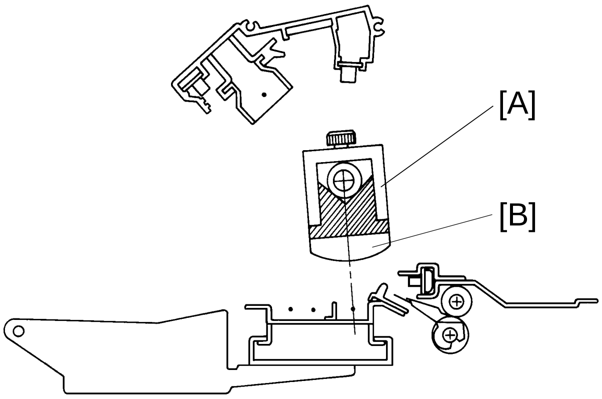


A173R580.img

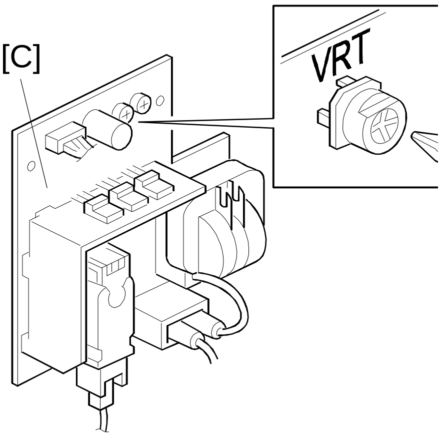
ADJUSTMENT STANDARD	Adjusting VR	
DC –760 ± 10 V	VRG	SP9-2

1. Unplug the power cord and set the multimeter range to dc 1500V and connect the multimeter leads as shown.
2. Plug the power cord in, turn on the main switch, front door safety switch, and grid using SP9-2.
3. Adjust VRG of the CC/G/B power pack to –760 ± 10 V by turning VRG on the CC/G/B power pack [A].
4. Press the C/⊙ key and turn the main switch off.

6.9.3 TRANSFER CORONA CURRENT ADJUSTMENT (SP9-5)



A173R581.img

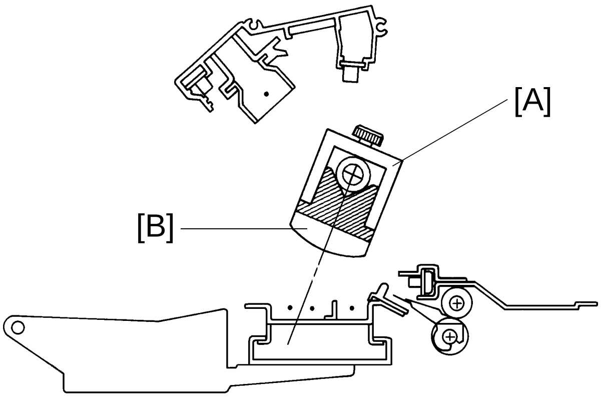


A173R582.wmf

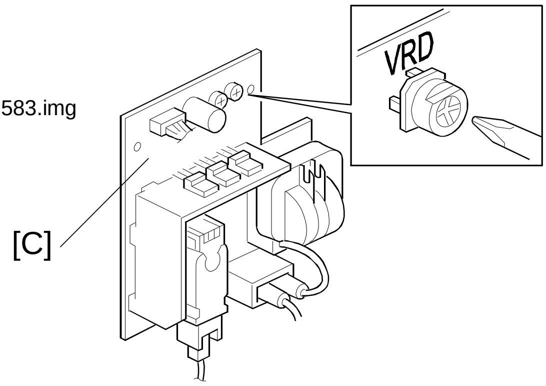
ADJUSTMENT STANDARD	Adjusting VR	
DC –24.8 ± 0.5 µA	VRT	SP9-5

1. Unplug the power cord, reinstall the TC/SC corona unit, and position the drum shoe [A] on the center of the shaft so that the axis of the current detection plate [B] is aligned with the transfer corona wire as shown.
2. Select the dc 200 µA range on the digital multimeter.
3. Turn on the main switch, front door safety switch, and transfer corona using SP9-5.
4. Adjust the transfer corona current to dc –24.8 ± 0.5 µA using VRT on the TC/SC power pack [C].
5. Press the C/⊙ key and turn the main switch off.

6.9.4 SEPARATION CORONA CURRENT ADJUSTMENT (SP9-8)



A173R583.img



A173R584.wmf

ADJUSTMENT STANDARD	Adjusting VR	
AC 41.6 ± 1.3 µA	VRD	SP9-8

1. Unplug the power cord, reinstall the TC/SC corona unit, and position the drum shoe [A] on the center of the shaft so that the axis of the current detection plate [B] is aligned with the separation corona wire as shown.

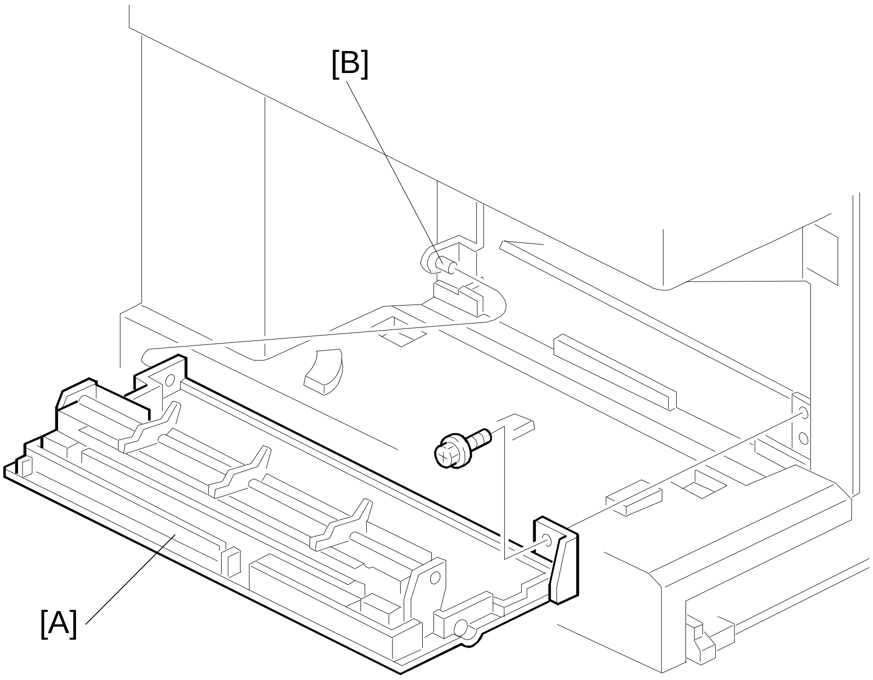
   NOTE: Make sure that the drum shoe does not touch the pick-off pawls.

2 Select the ac 200 µA range on the digital multimeter.

3. Turn on the main switch, the front safety switch, and the separation corona using SP9-8.
4. Adjust the separation corona current to ac 41.6 ± 1.3 µA using VRD on the TC/SC power pack [C].
5. Press the C/⊙ key and turn the main switch off.

7. FUSING

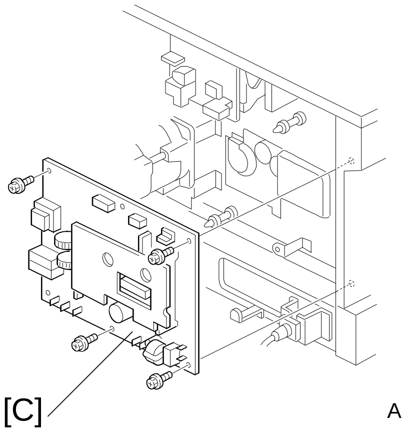
7.1 EXIT UNIT REMOVAL



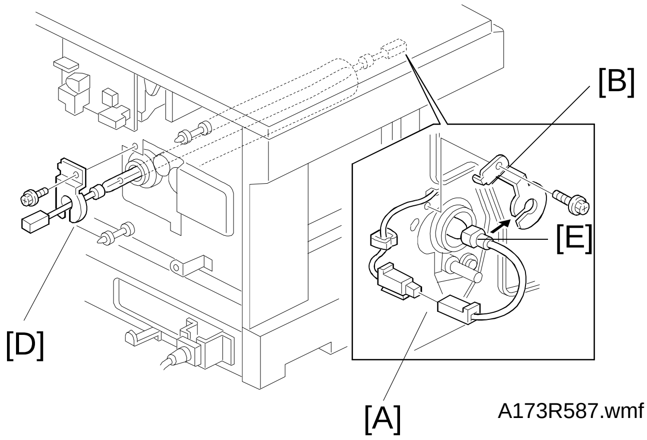
A173R585.wmf

1. Unplug the power cord.
2. Remove the copy receiving tray or slide the sorter to the left side if it is installed.
3. Open the exit unit [A].
4. Remove the exit unit (1 screw and the rear hinge pin[B]).

7.2 FUSING LAMP REPLACEMENT



A173R586.wmf



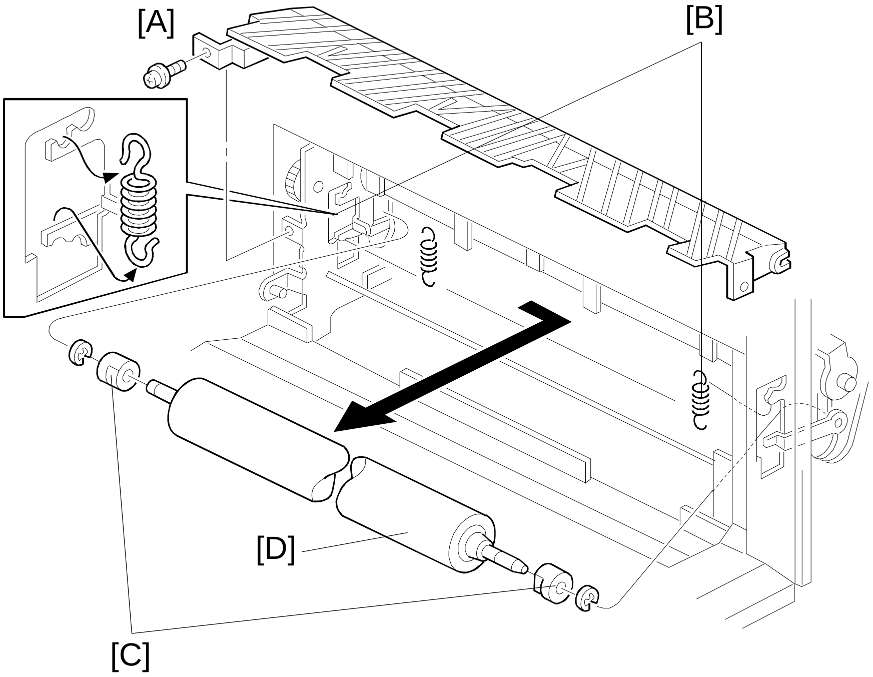
A173R587.wmf

1. Unplug the power cord.
2. Remove the rear cover (4 screws).
3. Remove the front door.
4. Remove the inner cover (7 screws).
5. Disconnect the connector [A] at the front side.
6. Remove the front support bracket [B].
7. Remove the power supply/ac drive board [C] (all the connectors, 4 screws, and 2 locking supports).
8. Remove the rear support bracket [D] (1 screw).
9. Pull out the fusing lamp [E] out of the front end of the fusing roller.

NOTE: a) Do not touch the fusing lamp with bare hands.

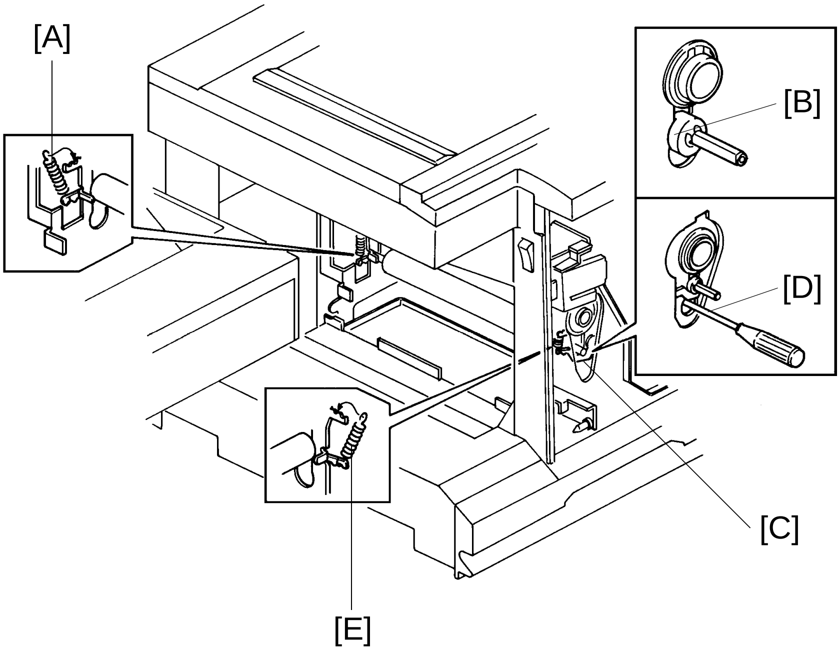
b) The connector housings used at the front and rear sides are different. (The rear harness is longer.)

7.3 PRESSURE ROLLER REPLACEMENT



A173R588.wmf

1. Remove the exit unit. (See Exit Unit Removal.)
2. Remove the rear cover and the power supply/ac drive board.
3. Remove the exit paper guide [A] (1 screw).
4. Remove the front and rear pressure springs [B].
5. Remove the front and rear bearings [C] (1 screw each).
6. Remove the pressure roller [D].

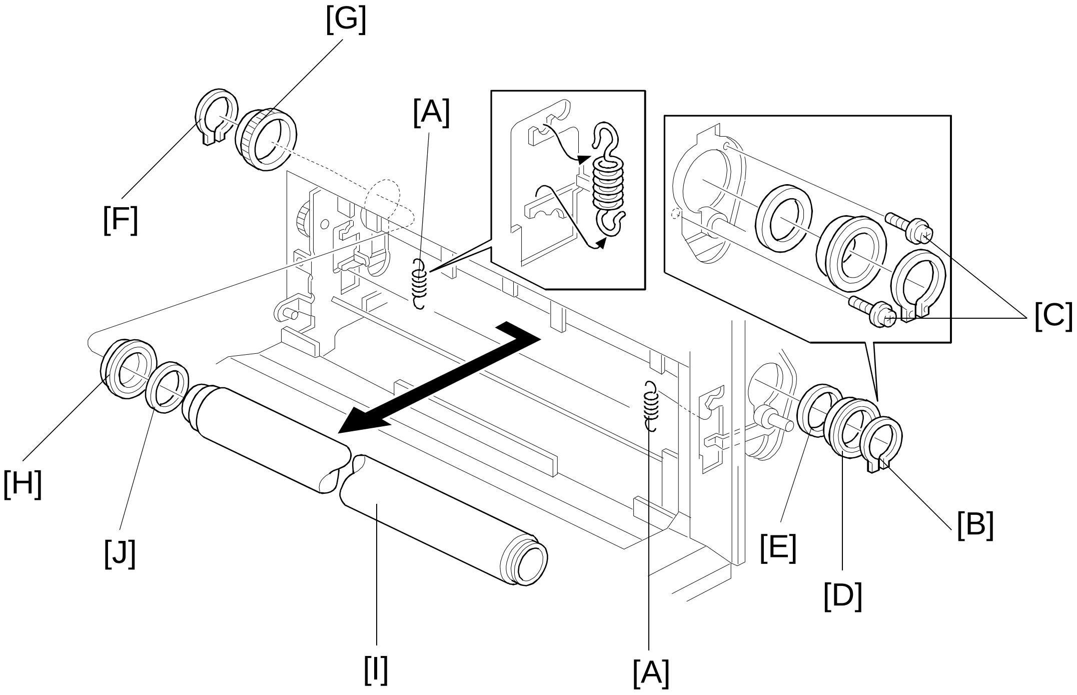


A173R589.img

– Reinstallation –

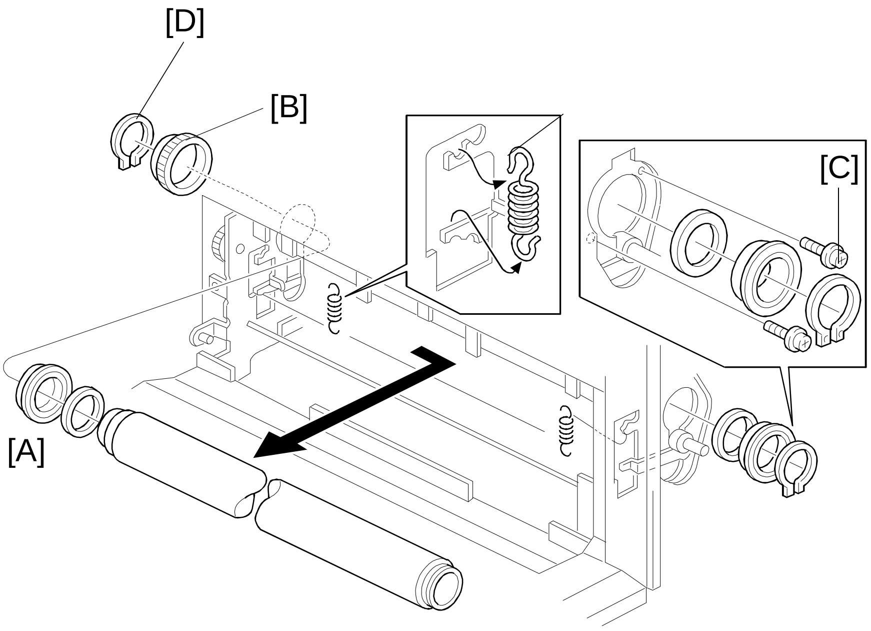
1. Install the bushings on both the front and rear roller shafts (1 E-ring each).
2. After setting the pressure roller, install the rear pressure spring [A] while sliding the bushing [B] up along the cutout in the rear frame as shown.
3. Slide the bushing up along the cutout in the front frame and pull the lower spring bracket [C] up as shown.
4. To hold the spring bracket, insert a screwdriver into the cutout [D] in the front frame as shown.
5. Install the front pressure spring [E].

7.4 HOT ROLLER REPLACEMENT



A173R590.wmf

1. Remove the exit unit. (See Exit Unit Removal.)
2. Remove the fusing lamp. (See Fusing Lamp Replacement.)
3. Remove the exit paper guide (1 screw).
4. Remove the front and rear pressure springs [A].
5. Remove the C-ring [B] (front side).
6. Remove the 2 screws [C] securing the bearing to the fusing unit front frame, then remove the bearing [D] and spacer [E].
7. Remove the rear C-ring [F].
8. Slide the hot roller out. The gear [G] and spacer [H] will drop off the hot roller shaft.
9. Remove the hot roller [I] (1 bearing [J]).



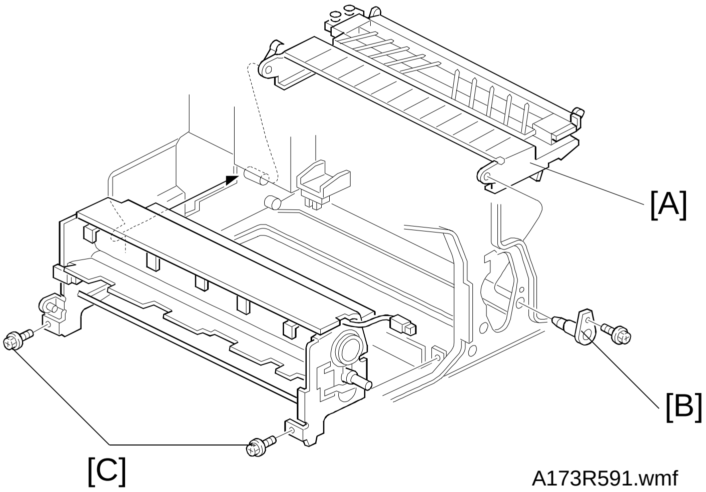
A173R590.wmf

– Reinstallation –

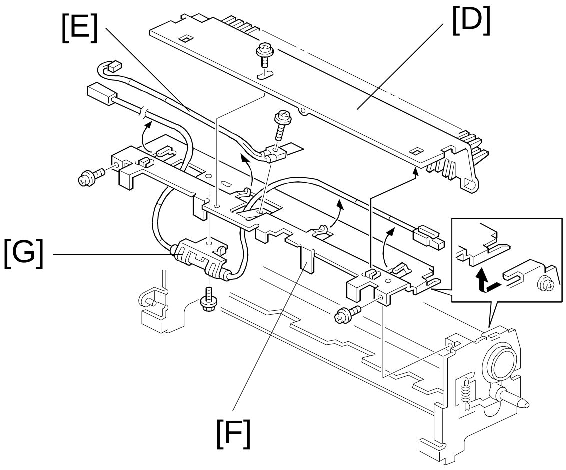
1. Set the rear bearing [A] on the rear frame.
2. Insert the rear end of the hot roller shaft through the rear bearing.
3. Place the gear [B] on the rear end of the shaft.
4. Install the front bearing and spacer, then secure them with two screws [C].
5. Set the rear side C-ring [D] on the rear shaft.

NOTE: a) Peel off 3 cm (1 inch) from both ends of the protective sheet before installing a new hot roller.
b) Before reinstalling the pressure springs, remove the rest of the protective sheet.
c) Before reinstalling the pressure springs, refer to the installation procedure in the Pressure Roller Replacement Section.

7.5 FUSING THERMISTOR AND THERMOFUSE



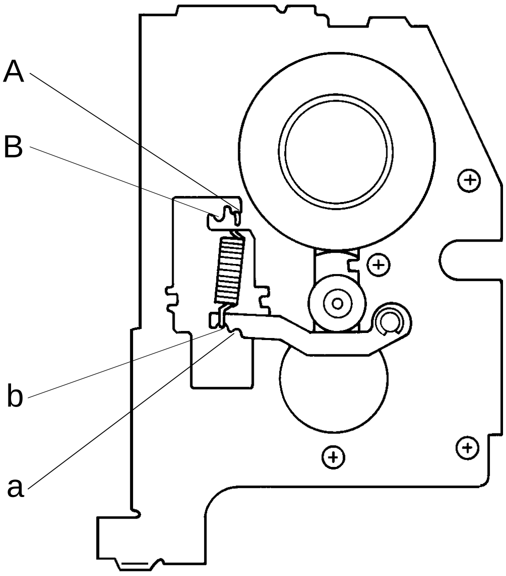
A173R591.wmf



A173R592.wmf

1. Unplug the power cord. Remove the front door, left cover, left lower cover, and rear cover.
2. Remove the power supply/ac drive board (all the connectors, 4 screws, and 2 locking supports).
3. Remove the exit unit. (See Exit Unit Removal.)
4. Remove the transport unit [A] (1 screw and holder [B]).
5. Remove the fusing unit [C] (2 screws).
6. Remove the fusing unit cover [D] (1 screw).
7. Replace the fusing thermistor [E].
8. Remove the bracket [F] (2 screws).
9. Replace the fusing thermofuse [G] (1 screw).

7.6 FUSING PRESSURE ADJUSTMENT



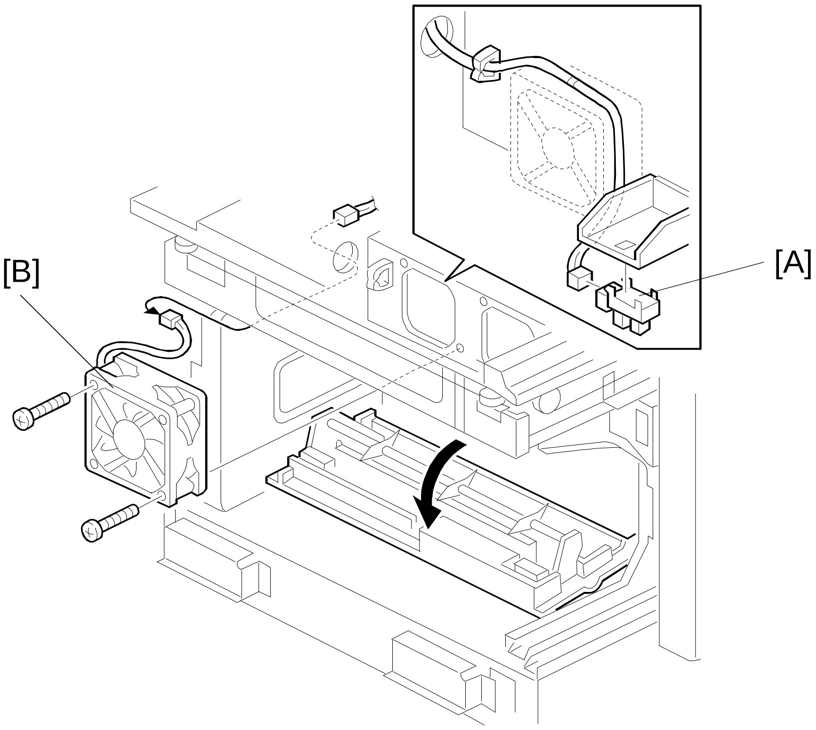
A173R593.img

– Fusing pressure adjustment combinations –

Combination	Pressure Level
A–a	Stronger
A–b	Factory Setting
B–b	Weaker

The fusing pressure can be set at three different levels. Adjust the pressure spring position to A–a if poor fusing occurs or to B–b if copy paper becomes creased. For removal and installation, see the Pressure Roller Replacement section.

7.7 EXHAUST BLOWER MOTORS/EXIT SENSOR REPLACEMENT

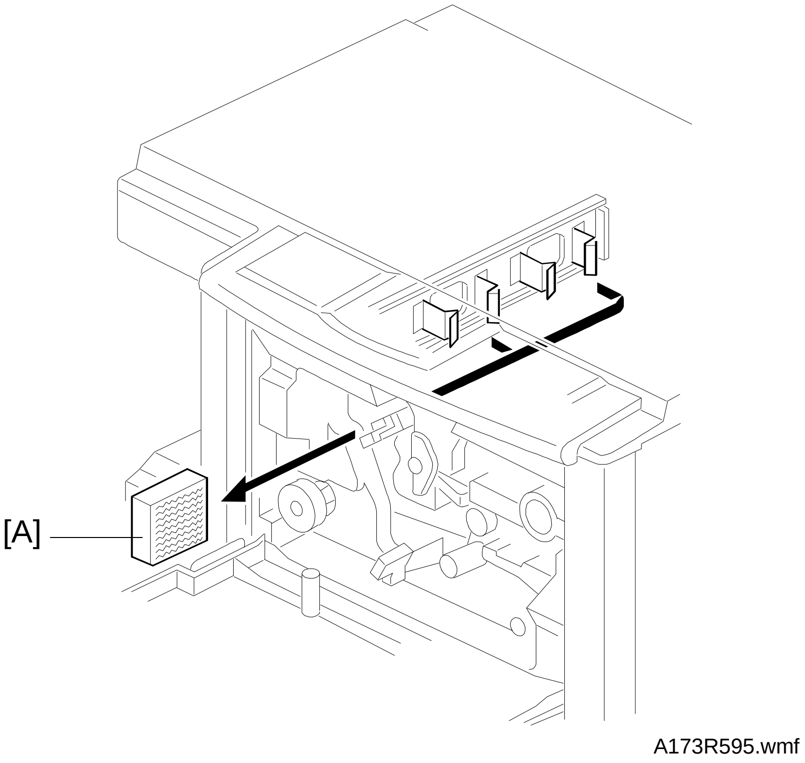


A173R594.wmf

1. Unplug the power cord.
2. Remove the rear cover (4 screws), and the left cover (4 screws).
3. Replace the exit sensor [A].
4. Replace the exhaust blower motors [B] (2 screws and 1 connector each).

8. OTHERS

8.1 OZONE FILTER REPLACEMENT



1. Open the front door.
2. Remove the cleaning unit.
3. Replace the ozone filters [A].

9. COPY QUALITY ADJUSTMENT

– General Information –

Image density is affected by the following factors:

(1) Light Intensity
(2) Bias Voltage
(3) Toner Density
(4) Grid Voltage
(5) Charge Corona Current

The items listed above must be kept in balance to maintain correct image density.

In the field, image density should be adjusted first by changing the exposure lamp voltage. If results are unsatisfactory, the bias voltage can be changed. Also, if requested by the customer, the overall image density can be changed by changing the toner density. Normally, this should be kept at the normal position (that is, at the factory setting).

The grid voltage and charge corona current are carefully adjusted at the factory. Any adjustment out of the adjustment standard will result in overtoning, toner scattering, dirty background, or light image density problems. The grid voltage and charge corona current adjustment should be done only when replacing the CC/G/B power pack or to correct certain problems with image density after checking the other possible causes.

9.1 LIGHT INTENSITY ADJUSTMENT

When:	Every call
Purpose:	To maintain the correct light intensity.
Adjustment Standard:	Level 2 of the gray scale on the OS-A3 chart should be just visible on the copy when the 4th manual image density level is selected.
Method:	SP48
How it works:	Changes the ac drive board output voltage.

1. Unplug the power cord.
2. Clean the following parts:

Item No.	Section	Method
(1)	Optics (mirrors, lens, reflectors, shield glass, exposure glass)	Damp cotton, silicone cloth, and blower brush
(2)	ID sensor	Blower brush
(3)	Corona wires (charge, transfer, and separation) and casing.	Water
(4)	Quenching Lamp, erase lamp	Dry cloth

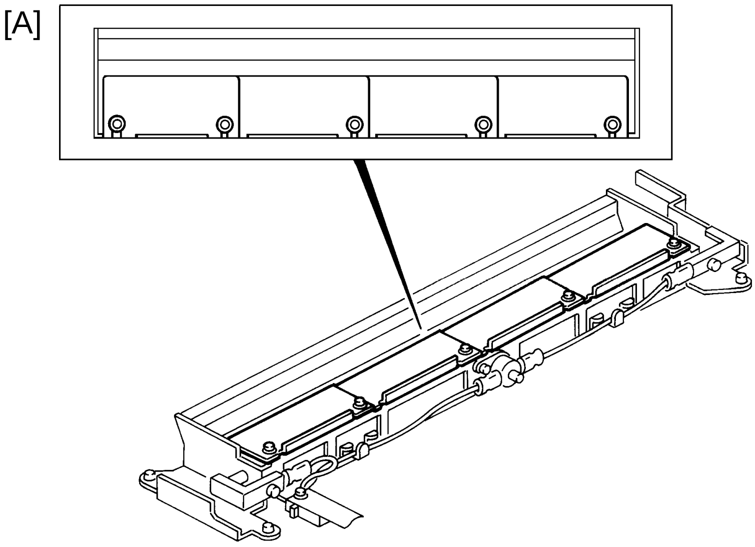
3. Place the OS-A3 chart on the exposure glass and make a full size copy at manual image density level #4 (center).
4. Confirm that level 2 of the gray scale is just visible on the copy. If the image density is not correct, proceed to the following steps.
5. Enter the lamp voltage adjustment mode (SP48).
6. Change the setting with the numeral keys as follows:

If the image density is too dark:	Increase the value
If the image density is too light:	Decrease the value

7. Confirm that the image density is within the adjustment standard.
8. Perform the ADS adjustment (SP56).

9.2 UNEVEN EXPOSURE ADJUSTMENT

When:	The exposure is uneven from side to side.
Purpose:	To maintain even exposure.
Adjustment Standard:	The side-to-side variation of the gray scales on the test chart should be less than one level.
Method:	Move the exposure adjustment plates.
How it works:	Changes the position of the adjustment plates to make the light intensity from the exposure lamp even across its length.



A173R596.img

NOTE: If this adjustment fails to solve the problem, adjust the wire height using the drum shoe. (See Charge Corona Current Adjustment.)

1. Clean the optics components and the charge corona wire.
2. Place a test chart on the exposure glass and make an A3/LDG copy.
3. If the side-to-side variations of the gray scales is not within the adjustment standard, turn off the main switch and remove the exposure glass. (See Exposure Glass Removal.)
4. Position the adjusting plates [A] so that the copy image meets the adjustment standard.

9.3 BIAS VOLTAGE ADJUSTMENT

When:	1. The image is blurred even though the image density in black solid areas is acceptable. 2. Dirty background. The problem is not caused by excess toner and cannot be solved by adjusting the light intensity.
Purpose:	To improve the copy image.
Method:	SP37
How it works:	Changes the bias voltage while the image area on the drum is being developed.

SP37

Data	0	1	2	3	4
Bias Voltage [V]	V_0	$V_0 + 40$	$V_0 + 20$	$V_0 – 20$	$V_0 – 40$
Image Density	Normal	Darkest	Darker	Lighter	Lightest

NOTE: V_0 is the standard voltage applied to the development roller.

1. Make a copy after adjusting the light intensity.
2. If the image is blurred:
   Decrease the bias voltage by one step and readjust the light intensity.

   If the background is dirty:
   Increase the bias voltage by one step and readjust the light intensity.

9.4 TONER DENSITY ADJUSTMENT

When:	The customer wants to change the overall image density of the copies.
Purpose:	To change the toner concentration inside development unit.
Method:	SP33
How it works:	Changes the ID pattern bias voltage and either raises or lowers the toner supply threshold.

9.5 FIXED TONER SUPPLY MODE SELECTION

When:	A problem with the ID detection system cannot be corrected during a service call. (Detect supply mode does not function.)
Purpose:	To leave detect supply mode and manually turn on the toner supply system.
Method:	SP30
How it works:	Turns on the toner supply clutch every copy cycle.

9.6 TONER SUPPLY RATIO SELECTION

When:	The factory setting for the toner supply amount is not appropriate for the type of original in use.
Purpose:	To adjust the toner supply amount.
Adjustment Standard:	Detect Mode: 15% (Factory Setting) Fixed Mode: 7% (Factory Setting)
Method:	Detect Mode: SP31 Fixed Mode: SP32
How it works:	Changes the toner supply clutch on period.

9.7 VERTICAL MAGNIFICATION ADJUSTMENT

When:	The vertical magnification is not within the adjustment standard.
Purpose:	To maintain proper vertical magnification.
Adjustment Standard:	Less than ± 0.5% difference between original and copy.
Method:	SP43 (0.2 %/step, 15 steps)
How it works:	Changes the scanner speed compensation.

1. Place a 150 mm scale perpendicular to the left scale on the exposure glass.
2. Adjust the vertical magnification using SP43. Make three copies to check the magnification.

9.8 HORIZONTAL MAGNIFICATION ADJUSTMENT

When:	The horizontal magnification is not within the adjustment standard. After loosening the first scanner wire clamps.
Purpose:	To maintain proper horizontal magnification.
Adjustment Standard:	Less than ± 0.5% difference between original and copy.
Method:	1. Rough adjustment: Adjust the position of the first scanner wire clamps. 2. Fine adjustment: SP44 (0.2 %/step, 31 steps)
How it works:	1. Changes the distance between the original and the drum. 2. Changes the lens home position.

– Rough Adjustment –

1. Change the setting of SP44 to 16 (default value).
2. Position the scanner wire clamps using the scanner positioning pins. (See Scanner Wire Installation.)

– Fine Adjustment –

3. Place a 150 mm scale parallel to the left scale on the exposure glass.
4. Adjust the horizontal magnification using SP44. Make three copies to check the magnification.

9.9 FOCUS ADJUSTMENT

When:	The copy image is out of focus. After adjusting the horizontal magnification.
Purpose:	To maintain proper focus.
Adjustment Standard:	Copy image in focus.
Method:	SP47 (80 steps)
How it works:	Adjusts the 4th/5th mirror assembly home position, changing the the distance between the original and the drum surface.

1. Make three A3/LDG copies with the test chart.
2. Adjust the focus using SP47. Check the text on the copies.

9.10 LEADING EDGE ERASE MARGIN ADJUSTMENT

When:	The leading edge erase margin is not within the adjustment standard.
Purpose:	To maintain the correct leading erase margin.
Adjustment Standard:	2.5 ± 1.5 mm (0.1 ± 0.06")
Method:	SP41 (0.5 mm/step, 15 steps)
How it works:	Changes the erase lamp on period.

1. Place a 150 mm scale perpendicular to the left scale on the exposure glass.
2. Adjust the leading edge erase margin using SP41. Make three copies and check the erase margin.

9.11 REGISTRATION ADJUSTMENT

When:	Registration is not within the adjustment standard.
Purpose:	To maintain proper registration.
Adjustment Standard:	0 ± 2 mm (0 ± 0.08")
Method:	SP42 (0.5 mm/step, 15 steps)
How it works:	Changes the registration roller start timing.

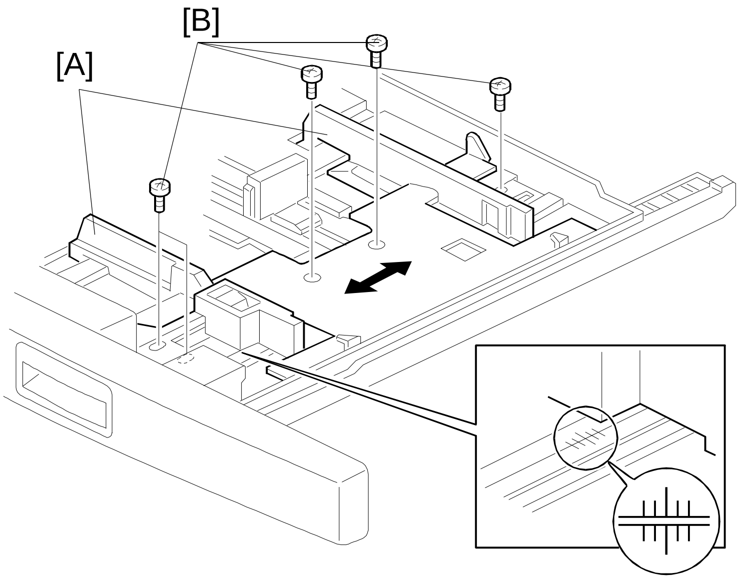
1. Place a 150 mm scale perpendicular to the left scale on the exposure glass.
2. Adjust the registration using SP42. Make three copies and check the registration.

9.12 SIDE-TO-SIDE REGISTRATION ADJUSTMENT

When:	Side-to-side registration is not within the adjustment standard.
Purpose:	To maintain the proper side-to-side registration.
Adjustment Standard:	0 ± 2 mm (0 ± 0.08")
Method:	1. Change the lens position. 2. Change the sIde fence position in the paper tray.
How it works:	Shifts the copy image.

NOTE: a) When side-to-side registration is incorrect and only the paper tray is being used, adjust the side fence position.

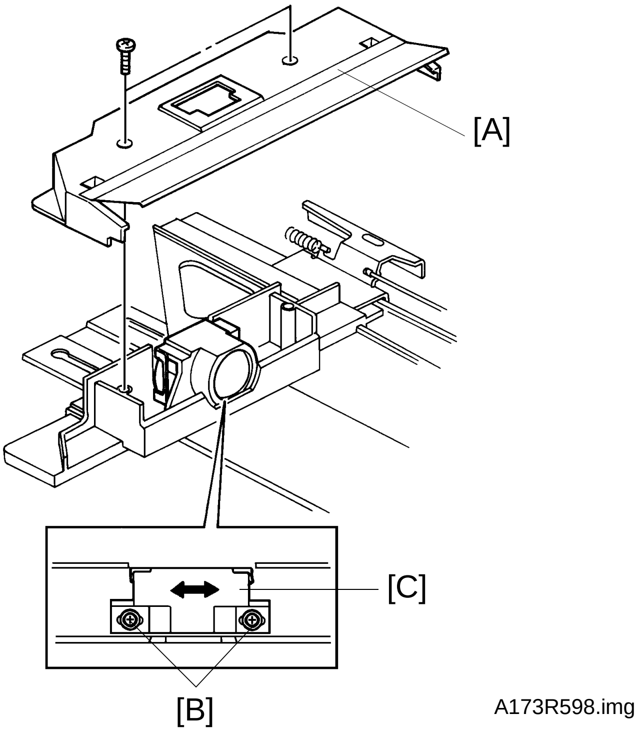
b) When side-to-side registration is incorrect for both the first paper feed station and the second paper feed station, adjust the lens position. Check the adjustment by making a copy from the first paper feed station. Then, make a copy from the paper tray feed station and adjust the paper tray side fences if necessary.



A173R597.wmf

– Side Fence Adjustment (Paper Tray) –

1. Pull the paper tray out.
2. Move the side fences [A] to the A4 lengthwise position.
3. Loosen the five screws [B].
4. Set the side fences in the desired position.



– Lens Position Adjustment –

1. Unplug the power cord and remove the exposure glass. (See Exposure Glass Removal.)
2. Remove the lens housing cover (2 screws) and the lens cover [A] (2 screws).
3. Loosen two screws [B] and shift the lens [C] from side to side to adjust the registration.

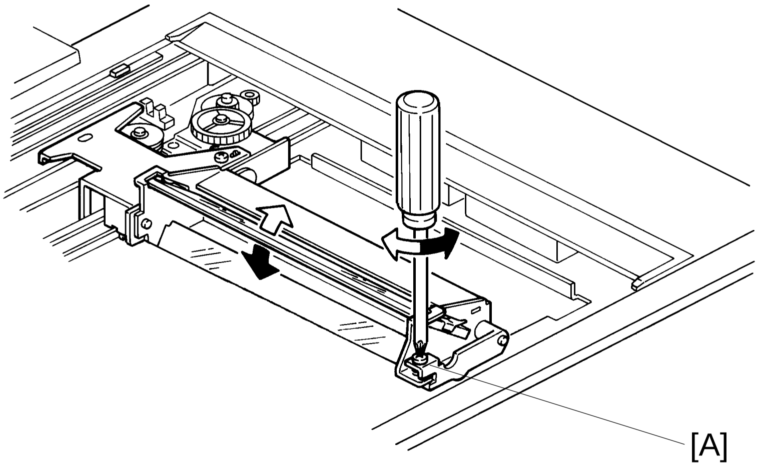
   NOTE: Do not move the lens more than 2 mm (from the center position) in either direction (front/rear). Otherwise, the lens may contact the lens unit rail while moving from home position to the selected reduction or enlargement position.
4. Make sure the lens moves smoothly when changing the magnification ratio.

9.13 4TH/5TH MIRROR HEIGHT ADJUSTMENT

When:	Parallelogram (skewed) image appears.
Purpose:	To maintain the proper copy image.
Method:	Turn the 4th/5th mirror height adjustment screw.
How it works:	Changes the 4th/5th mirror height.

IMPORTANT

Never perform this adjustment until you have positively verified that the source of the skewing is optical and not in the paper path.



A173R599.img

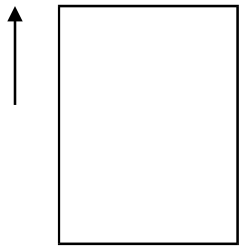
1. Unplug the power cord and remove the exposure glass. (See Exposure Glass Removal.)
2. Remove the lens housing cover (2 screws).
3. Adjust the 4th/5th mirror height by turning the screw [A]. Refer to the arrows in the illustration.

SECTION 6

TROUBLESHOOTING

1. COPY QUALITY

1.1 BLANK COPY (WHITE COPY)



A173T500.wmf

– Symptom –

White or almost white copy

– Possible Causes –

1. Charge is not applied.
    - CC/G/B bias power pack (charge or grid) failure
    - Poor power pack lead wire contact
    - Broken charge corona wire
    - Leak in an insulator or endblock

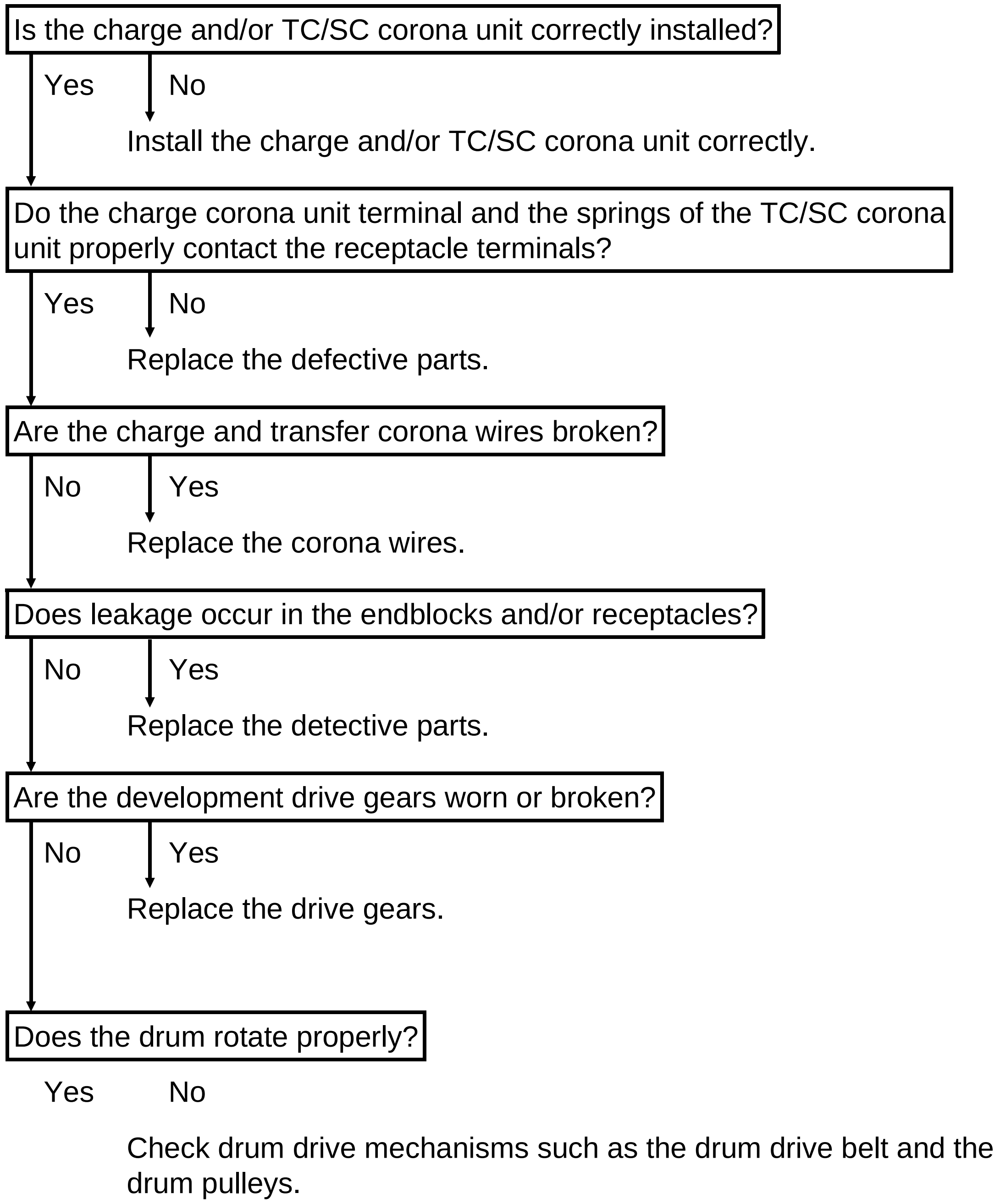
2. The copy image is not transferred to the paper.
    - TC/SC power pack (transfer) failure
    - Poor power pack lead wire contact
    - Poor transfer corona wire contact
    - Leak in an insulator or the endblocks

3. The development roller does not rotate.
    - Broken drive gear

4. Poor drum sensitivity
    - Drum exposed to fluorescent light or direct sunlight for long period of time.
    - Drum exposed to ammonia gas or fumes for long period of time.

5. The drum does not rotate.

– Action –



Is the charge and/or TC/SC corona unit correctly installed?

Yes No

Install the charge and/or TC/SC corona unit correctly.

Do the charge corona unit terminal and the springs of the TC/SC corona unit properly contact the receptacle terminals?

Yes No

Replace the defective parts.

Are the charge and transfer corona wires broken?

No Yes

Replace the corona wires.

Does leakage occur in the endblocks and/or receptacles?

No Yes

Replace the detective parts.

Are the development drive gears worn or broken?

No Yes

Replace the drive gears.

Does the drum rotate properly?

Yes No

Check drum drive mechanisms such as the drum drive belt and the drum pulleys.

Check the following points:

- CN119-6 (charge trigger line) and CN119-4 (Grid trigger line)
  (1) If the signal stays HIGH after the Start key is pressed, replace the main board.
  (2) If the charge corona does not turn on even if the signal changes to LOW, replace the CC/Grid/Bias power pack.

- CN119-10 (Transfer trigger line)
  (1) If the signal stays HIGH after the Start key is pressed, replace the main board.
  (2) If the transfer corona does not turn on even if the signal changes to LOW, replace the TC/SC power pack.

If there is no problem with the signal lines, replace the drum if the sensitivity does not recover even when the drum is not exposed to light.

1.2 DIRTY BACKGROUND

– Symptom –

1. Dirty background at image density level 4 (manual setting).
2. ADS copies have a dirty background.

– Possible Causes –

1. V_L correction failure
    - Very dirty optics (V_L correction cannot compensate)
    - Deteriorated exposure lamp (maximum output cannot give sufficient light intensity)
    - Dirty erase lamp unit

2. V_R correction failure
    - CC/Grid/Bias Power Pack (development bias) failure
    - Poor development bias contact
    - The development bias is grounded

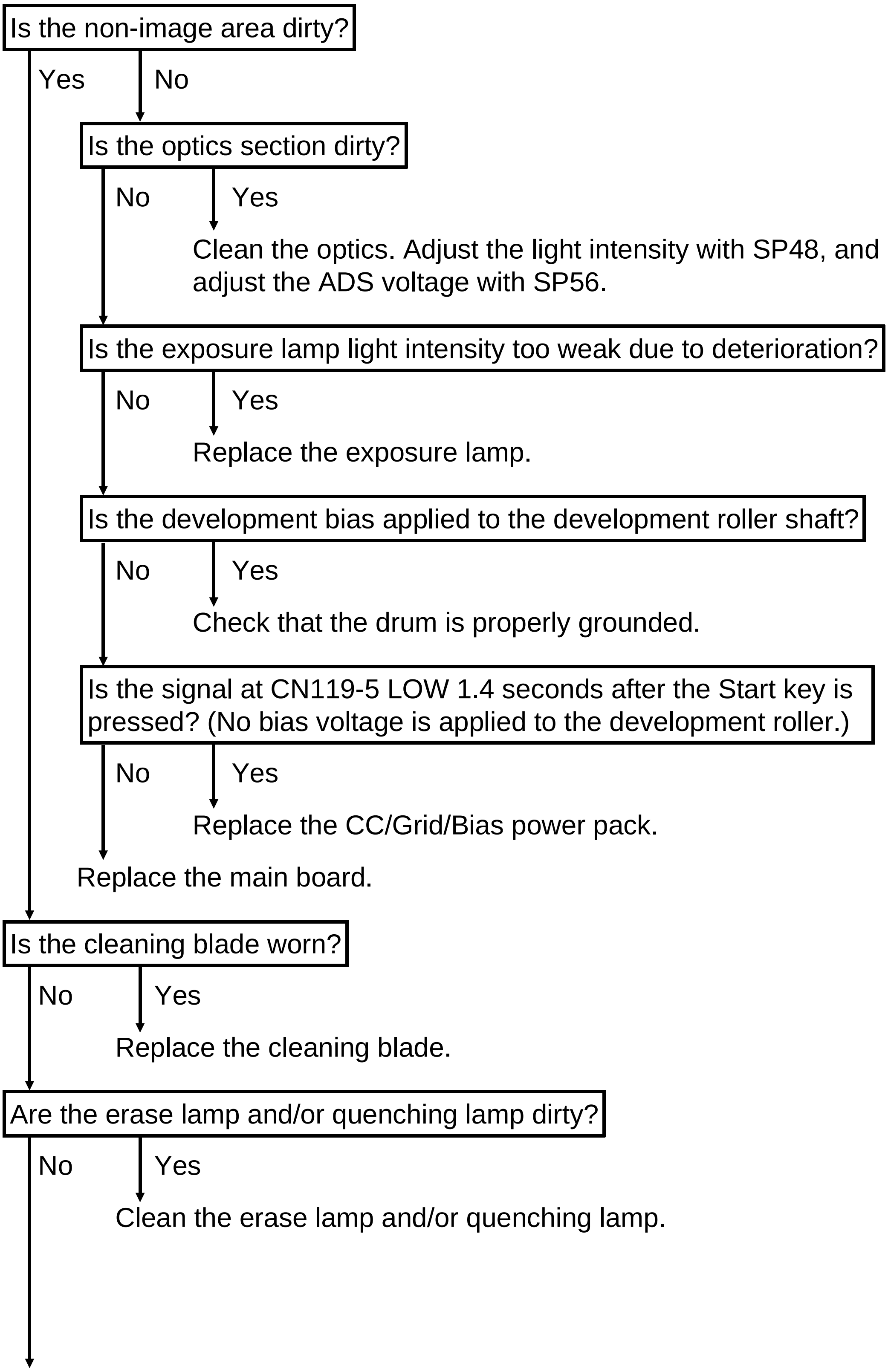
3. The drum is not grounded properly.

4. ADS mode
    - Incorrect ADS Density setting (SP34)
    - ADS Sensor board failure
    - CC/Grid/Bias Power Pack failure

5. High toner density
    - Incorrect ID Sensor bias setting (SP33)
    - Dirty erase lamp unit
    - Toner scattering occurs

– Action –

Make a copy in reduction mode at manual image density level 4.



Is the non-image area dirty?

Is the optics section dirty?

Clean the optics. Adjust the light intensity with SP48, and adjust the ADS voltage with SP56.

Is the exposure lamp light intensity too weak due to deterioration?

Replace the exposure lamp.

Is the development bias applied to the development roller shaft?

Check that the drum is properly grounded.

Is the signal at CN119-5 LOW 1.4 seconds after the Start key is pressed? (No bias voltage is applied to the development roller.)

Replace the CC/Grid/Bias power pack.

Replace the main board.

Is the cleaning blade worn?

Replace the cleaning blade.

Are the erase lamp and/or quenching lamp dirty?

Clean the erase lamp and/or quenching lamp.

↓ No

If toner scattering occurs, see the toner scattering chapter of this section.

If the dirty background occurs only in ADS mode, do the following:

- If the ADS voltage is not within 2.5 ±0.1 volts (this is the standard voltage), readjust the ADS voltage.
- If the signal at CN103-11 stays HIGH, check the harness and/or sensor, and replace any defective parts.
- If the signal at CN103-10 stays LOW, replace the main board.

1.3 UNEVEN IMAGE DENSITY

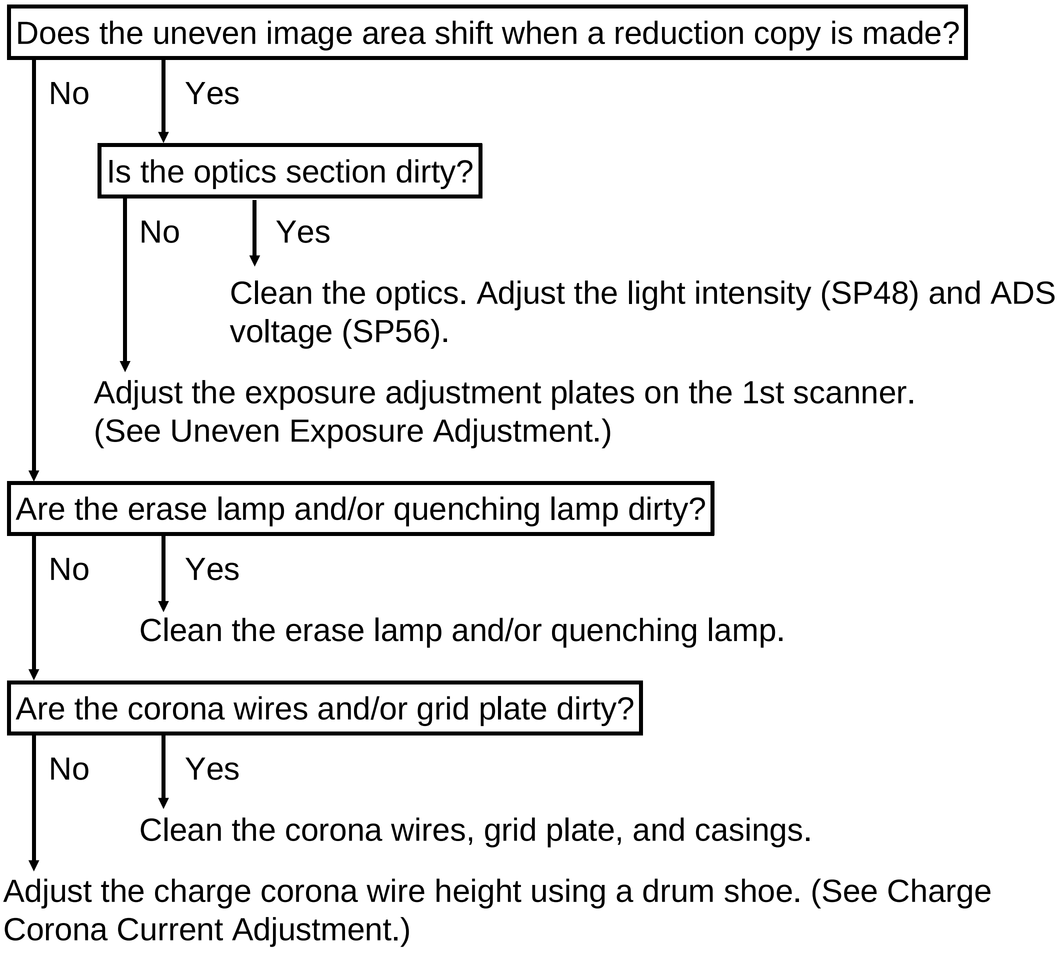
– Symptom –

Uneven image density appears on the copies.

– Possible Cause –

1. Dirty optics
2. Uneven exposure lamp horizontal position.
3. Dirty corona wires or grid
4. Uneven charge corona wire height.

– Action –



Does the uneven image area shift when a reduction copy is made?

No Yes

Is the optics section dirty?

No Yes

Clean the optics. Adjust the light intensity (SP48) and ADS voltage (SP56).

Adjust the exposure adjustment plates on the 1st scanner. (See Uneven Exposure Adjustment.)

Are the erase lamp and/or quenching lamp dirty?

No Yes

Clean the erase lamp and/or quenching lamp.

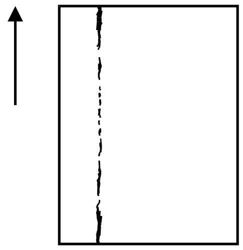
Are the corona wires and/or grid plate dirty?

No Yes

Clean the corona wires, grid plate, and casings.

Adjust the charge corona wire height using a drum shoe. (See Charge Corona Current Adjustment.)

1.4 VERTICAL BLACK BANDS



A173T501.wmf

– Symptom –

Vertical black bands appear on the copy paper.

– Possible Causes –

1. Dirty optics
2. Dust between the cleaning blade and drum
3. Deformed edge of the cleaning blade
4. Deformed cleaning brush
5. Deformed inlet seal on the development unit

– Action –

Do the black bands shift when a reduction copy is made?

No ↓ Yes ↓

Yes: Check and clean the optics section. Reset the V_L correction with SP94 and adjust the light intensity (SP48) and ADS voltage (SP56).

No ↓

Press the blade release lever down two or three times to clean the edge of the cleaning blade. If the black bands still appear, go to the next step.

↓

Is the edge of the cleaning blade deformed?

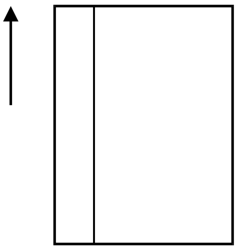
No ↓ Yes ↓

Yes: Replace the cleaning blade.

No ↓

If the inlet seal on the development unit is deformed, replace the inlet seal plate and the seal as a set.

1.5 VERTICAL BLACK LINES



A173T502.wmf

– Symptom –

Thin black lines appear on the copy.

– Possible Causes –

1. Scratched cleaning blade
2. Dirty or scratched exposure glass and/or dirty or scratched mirrors
3. Scratched or dirty drum
4. Scratched hot roller

– Action –

Do the black lines shift when a reduction copy is made?

No Yes

Clean or replace the exposure glass or mirrors. Reset the VL correction with SP94 and adjust the light intensity (SP48) and ADS voltage (SP56).

Is the edge of the cleaning blade scratched?

No Yes

Replace the cleaning blade.

Is the hot roller scratched?

No Yes

Check whether black lines appear on the copy by stopping the copy paper in the transport section. If no black lines appear, replace the hot roller.

Check whether the drum is scratched or toner is built-up on the drum.

- If toner is built-up on the drum, clean the drum with a damp cloth.
- If the drum is scratched, replace the drum.

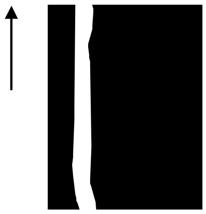
NOTE: After replacing the drum, perform the following SP modes.

- SP66 (Drum Initial Setting)
- SP48 (Light Intensity Adjustment)
- SP56 (ADS Voltage Adjustment)
- SP54 (Vsg Adjustment)

1.6 VERTICAL WHITE LINES OR BANDS–1 (DULL OR BLURRED)

– Symptom –

Dull or blurred white lines appear on the copy.

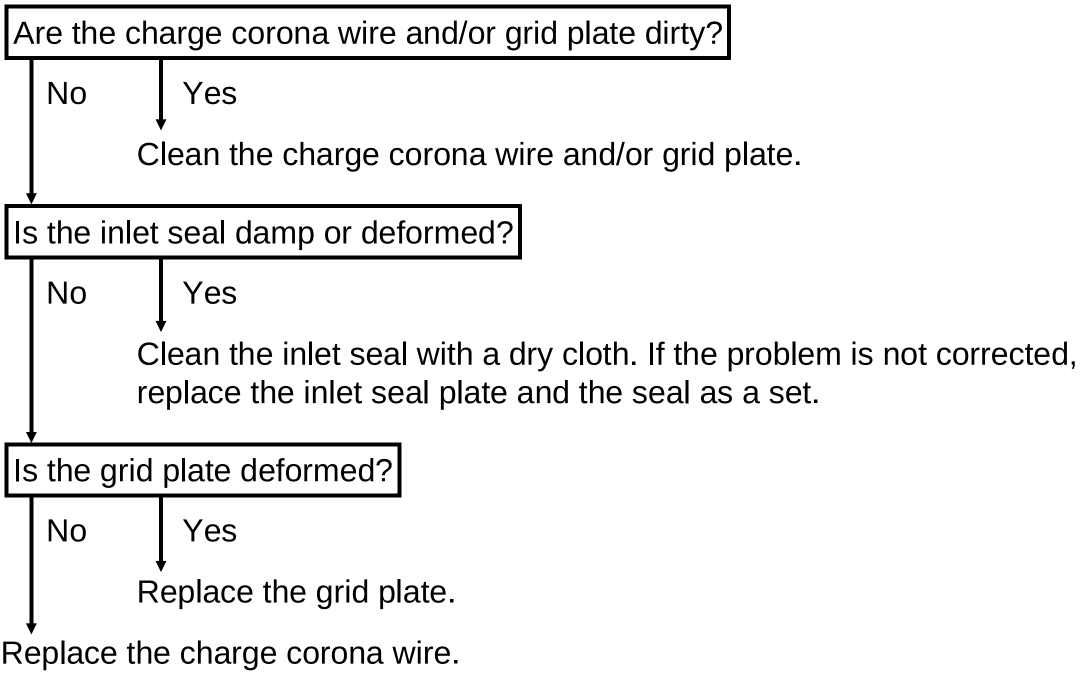


A173T503.wmf

– Possible Causes –

1. Dirty or deteriorated charge corona wire.
2. Dirty or deformed grid plate.
3. Damp or deformed inlet seal on the development unit.

– Action –



Are the charge corona wire and/or grid plate dirty?

No

Yes

Clean the charge corona wire and/or grid plate.

Is the inlet seal damp or deformed?

No

Yes

Clean the inlet seal with a dry cloth. If the problem is not corrected, replace the inlet seal plate and the seal as a set.

Is the grid plate deformed?

No

Yes

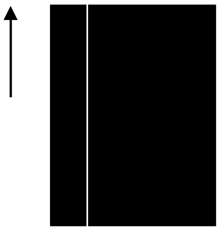
Replace the grid plate.

Replace the charge corona wire.

1.7 VERTICAL WHITE LINES OR BANDS–2 (THIN, DISTINCT)

– Symptom –

Vertical white lines appear on the copy.



A173T504.wmf

– Possible Causes –

1. Paper dust on the edge of the cleaning blade
2. Scratched drum
3. Scratched hot roller

– Action –

Press the cleaning blade release lever down several times. Make a copy and if the white lines still occur, go to the next step.

↓

Make a copy and stop the machine when the paper reaches the transport section. Do white lines appear on the copy?

No ↓ Yes ↓

Replace the drum if it is scratched.

Replace the hot roller if it is scratched.

NOTE: If the drum is scratched, find out what caused the scratches on the drum and correct the problem.

- Paper Jam
- Incorrect positioning of the pick-off pawls
- Foreign substances on the cleaning brush and/or blade
- Carrier leakage

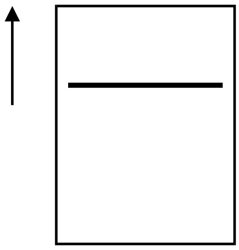
After replacing the drum, perform the following SP modes:

- SP66 (Drum Initial Setting)
- SP48 (Light Intensity Adjustment)
- SP56 (ADS Voltage Adjustment)
- SP54 (Vsg Adjustment)

1.8 HORIZONTAL BLACK/WHITE LINES

– Symptom –

Black/white lines perpendicular to the paper feed direction appear on the copy.

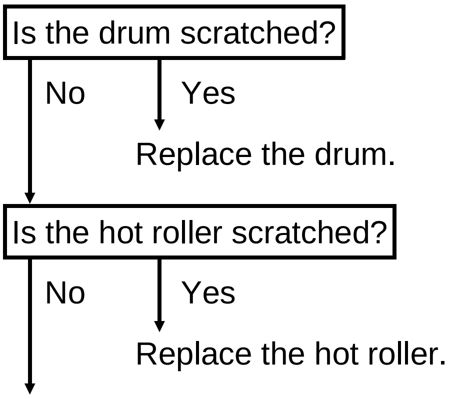


A173T505.wmf

– Possible Causes –

1. The drum is scratched.
   If black lines appear at 251 mm intervals, the cause is a scratched drum or toner build-up.
2. The hot roller is scratched.
   If black lines appear at 125 mm intervals, the cause is a scratched hot roller.
3. Toner is adhered to the drum surface.
   Due to insufficient cleaning, foreign matter may accumulate on the blade, causing toner to stick to the drum surface when the drum stops.

– Action –


Is the drum scratched?
No
Yes
Replace the drum.
Is the hot roller scratched?
No
Yes
Replace the hot roller.

If toner adheres to the drum surface, clean the drum with water. Also clean or replace the cleaning blade and/or cleaning brush.

NOTE: After replacing the drum, perform the following SP modes.
- SP66 (Drum Initial Setting)
- SP48 (Light Intensity Adjustment)
- SP56 (ADS Voltage Adjustment)
- SP54 (Vsg Adjustment)

1.9 JITTER

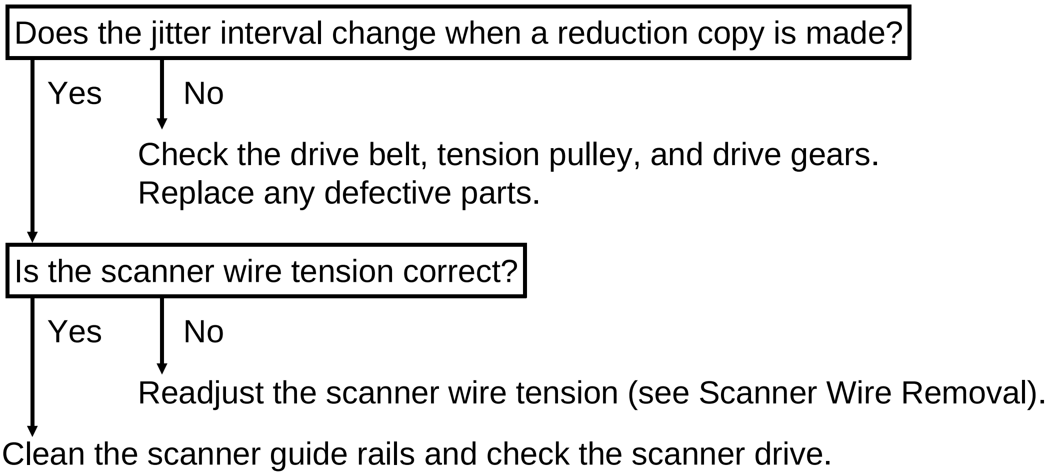
– Symptom –

Jitter appears on the copy.

– Possible Causes –

1. Vibration in the drive mechanism.
2. The scanner is not moving smoothly.

– Action –



Does the jitter interval change when a reduction copy is made?

Yes No

Check the drive belt, tension pulley, and drive gears.
Replace any defective parts.

Is the scanner wire tension correct?

Yes No

Readjust the scanner wire tension (see Scanner Wire Removal).

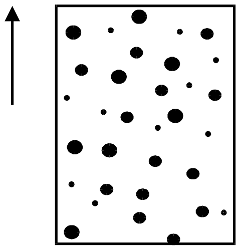
Clean the scanner guide rails and check the scanner drive.

1.10 BLACK SPOTS ON THE COPY IMAGE

– Symptom –

The grid voltage is not applied correctly.

- Poor contact between the charge corona casing and grid spring
- CC/Grid/Bias power pack defective
- Main board defective



A173T506.wmf

– Action –

Is there a good electrical contact between the charge corona casing and the grid spring?

Yes

No → Repair the poor contact and/or replace any parts if needed.

Yes → Check the voltage at CN119-1 on the main board.

0V

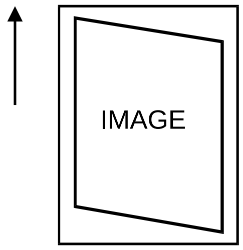
Not 0V → Replace the main board.

0V → Replace the CC/Grid/Bias power pack.

1.11 SKEWED (OPTICAL) COPY IMAGE

– Symptom –

The copy image is skewed into a parallelogram shape. The sides of the copy image are straight, but the leading and trailing edges are skewed.
(This differs from the paper path type of skewing.)



A173T507.wmf

– Possible Causes –

1. The 4th/5th mirror assembly is not parallel with the 1st and 2nd scanners.
2. The mirrors are in the wrong position
3. The stubs of the 4th/5th mirror assembly are off the rails.

– Action –

Is each mirror positioned correctly on its scanner and on the 4th/5th mirror assembly?

Yes No

Reposition the mirror correctly. If the spring plates are defective, replace them.

Are the stubs of the 4th/5th mirror assembly off the rails?

No Yes

Put the mirror assembly stubs back on the rails.

Readjust the height of 4th/5th mirror assembly by turning the adjusting screw.

1.12 TONER DENSITY TOO HIGH

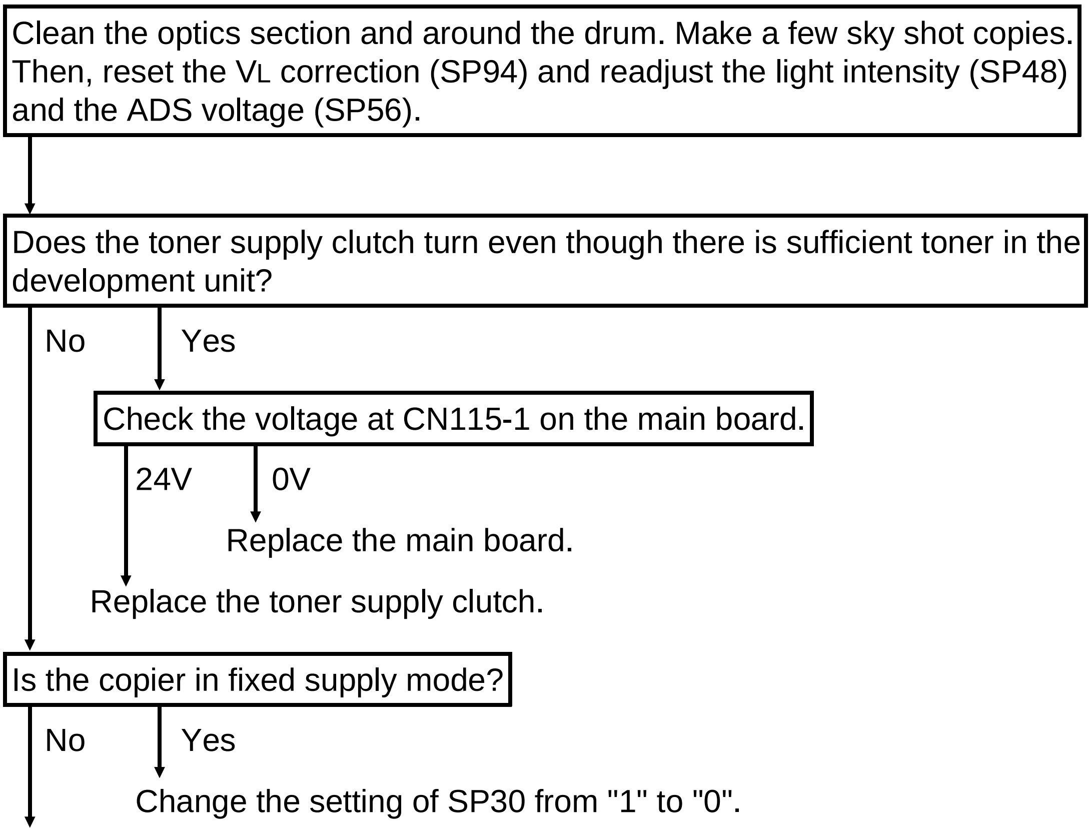
– Symptom –

1. Dirty background appears on the copy.
2. The image density of black solid areas is too high.
3. Toner has built up on the endblock cover of the TC/SC corona unit and also on the upper cover of the development unit.

– Possible Causes –

1. The light intensity of the exposure lamp is too high.
2. The toner supply clutch remains on continuously.
3. The copier is in fixed toner supply mode.
4. The defective main board.
5. The ID sensor bias voltage (modules) is too low.
6. The charge corona current is too low.
7. The ID sensor grid voltage is too low.

– Action –



Clean the optics section and around the drum. Make a few sky shot copies. Then, reset the V_L correction (SP94) and readjust the light intensity (SP48) and the ADS voltage (SP56).

Does the toner supply clutch turn even though there is sufficient toner in the development unit?

No

Yes

Check the voltage at CN115-1 on the main board.

24V

0V

Replace the main board.

Replace the toner supply clutch.

Is the copier in fixed supply mode?

No

Yes

Change the setting of SP30 from "1" to "0".

No

Is the charge corona current correct?

Yes / No

No: Readjust the charge corona current.

Yes:

Is the grid voltage correct?

Yes / No

No: Readjust the grid voltage as follows. Check the setting of SP62. If it is different from the factory setting, change it back to the factory setting.

Yes:

Check the setting of SP33. If it is "2", "3" or "5", readjust it to "0".

1.13 TONER DENSITY TOO LOW

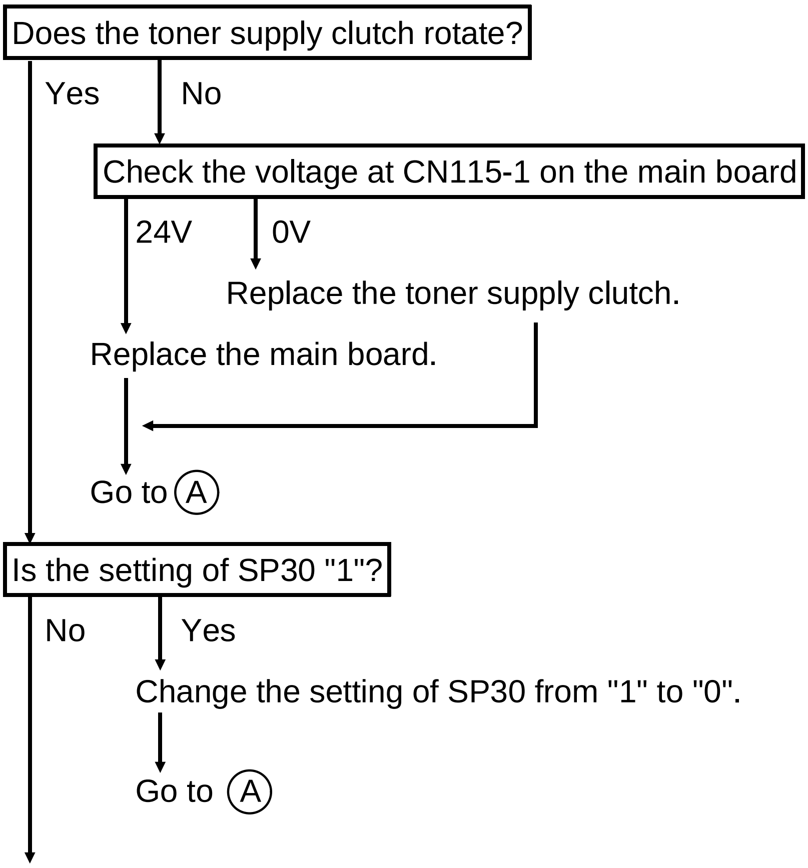
– Symptom –

1. Light copy
2. Carrier on the copy.
3. Light spots appear in black solid areas.

– Possible Causes –

1. The light intensity of the exposure lamp is too low.
2. The toner supply clutch does not rotate.
3. The copier is in the fixed toner supply mode.
4. The main board is defective.
5. The ID sensor voltage is too high.
6. The charge corona current is too high.
7. The ID sensor grid voltage is too high.

– Action –


Does the toner supply clutch rotate?
Yes
No
Check the voltage at CN115-1 on the main board
24V
0V
Replace the toner supply clutch.
Replace the main board.
Go to Ⓐ
Is the setting of SP30 "1"?
No
Yes
Change the setting of SP30 from "1" to "0".
Go to Ⓐ

No

Is the setting of SP33 "1", "4" or "6"?

No Yes

Change the setting of SP33 from "1", "4" or "6" to "0".

Go to Ⓐ

Is the charge corona current correct?

No Yes

Readjust the charge corona current.

Go to Ⓐ

Is the grid voltage correct?

Yes No

Readjust the grid voltage as follows. Check the setting of SP62. If it is different from the factory setting, change it back to the factory setting.

Ⓐ

Clean the optics section and around the drum.
Turn on DIP switch 101-1 on the main board. Place a few sheets of white paper on the exposure glass. Enter "99" using the number keys and press the Start key to start a free run. Continue the free run until Vsp becomes lower than 1/10 Vsg when viewed with SP55.

Adjust the light intensity (SP48), ADS voltage (SP56), and/or Vsg (SP54).

1.14 TONER SCATTERING

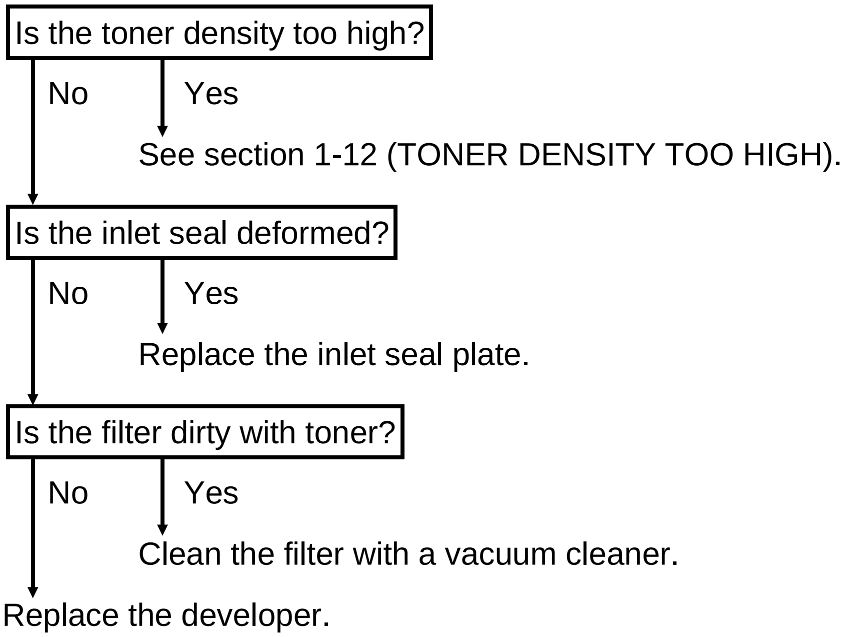
– Symptom –

Toner scatters from the development unit.

– Possible Causes –

1. The toner density is too high.
2. The inlet seal on the development unit is out of position.
3. The filter on the top of the development unit is dirty.
4. The developer deterioration

– Action –



Is the toner density too high?

No

Yes → See section 1-12 (TONER DENSITY TOO HIGH).

Is the inlet seal deformed?

No

Yes → Replace the inlet seal plate.

Is the filter dirty with toner?

No

Yes → Clean the filter with a vacuum cleaner.

Replace the developer.

1.15 UNFUSED COPY IMAGE

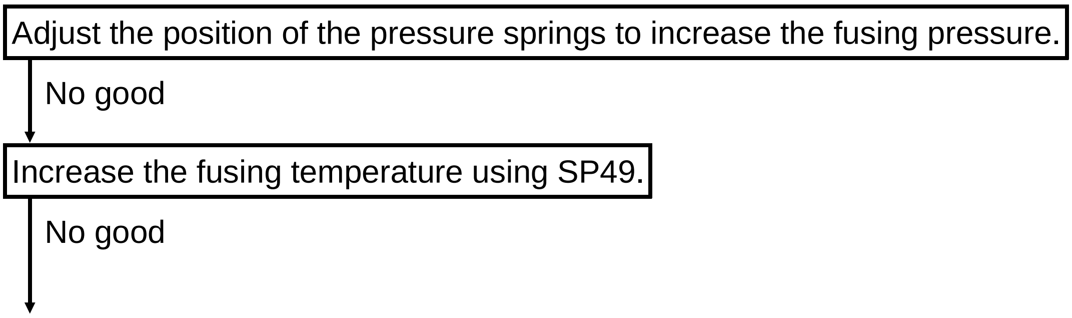
– Symptom –

Solid images rub off easily.

– Possible Causes –

1. Fusing pressure is too weak.
2. Fusing temperature is too low.
3. Thermistor malfunction

– Action –



Adjust the position of the pressure springs to increase the fusing pressure.

No good

Increase the fusing temperature using SP49.

No good

Check the thermistor. If the thermistor is malfunctioning, replace it.

1.16 PAPER MISFEED

– Symptom –

1. The misfeed location indicator turns on when the main switch is turned on even if there is no paper in the copier.
2. The misfeed location indicator always turns on at the same location when copies are made.

– Possible Causes –

1. A sensor is defective.
2. Mechanical and/or electrical malfunction

– Action 1 (Initial Misfeed) –

Check which sensor is defective using the Input Check mode (SP8). Replace the defective sensor. If no sensors are defective, replace the main board.

– Action 2 (Misfeed during a copy cycle) –

Set jam detection mode (SP6) to on and make a copy to see whether a misfeed occurs.

Misfeed

No misfeed

Use SP6 to switch misfeed detection on again. Then check which sensor is defective; replace that sensor.
If no sensors are defective, replace the main board.

Check whether a mechanical or electrical malfunction occurs. Replace any defective parts.

1.17 DF ORIGINAL MISFEED OR SKEW

– Symptom –

When the DF is in use, the original stops on the exposure glass or is skewed even if the electrical components are functioning normally.

– Possible Causes –

1. The exposure glass is upside-down.
2. Friction between the exposure glass and the feed belt

– Action –

Is the red mark on the exposure glass facing up?

Yes ↓ No ↓

No: Reinstall the exposure glass so that the red mark faces up.

Yes: Clean the exposure glass surface with alcohol or water. Pour a small amount of silicone oil on the exposure glass and wipe the exposure glass with a dry cloth to reduce the friction between the exposure glass and the feed belt.

2. U-CODE CONDITIONS

2.1 U1 - RIGHT COVER OPEN

– Possible Cause –

- The right cover stays open
- Right cover switch failure
- Main board defective

2.2 U2 - KEY COUNTER NOT SET

– Possible Cause –

- The key counter is not set properly
- Key counter connector defective
- Main board defective

2.3 U4 - SORTER OPEN

– Possible Cause –

- The sorter stays open
- Sorter switch failure
- Main board defective

2.4 U6 - DRUM PROTECTION SHEET REMAINING

– Possible Cause –

- The drum protection sheet remains on the drum.
- ID sensor failure
- Main board defective

3. SERVICE CALL CONDITIONS

NOTE: a) E-codes (E1 to E7) are displayed in the copy counter. To display both digits of the E-code, press the Enter key.

Example:
When the machine detects the E11 condition, E1 is displayed in the copy counter. Hold down the Enter key, and "11" is displayed in the copy counter.

b) When service call (E5) conditions occur, they cannot be cleared by turning off/on the main switch, for safety reasons. The following procedure must be performed to clear these service call conditions:

1. Turn on the main switch.
2. Turn DIP switch 101-1 on and off.
3. Turn the main switch off and on.

3.1 CODE #11 – EXPOSURE LAMP ERROR

– Definition –

- The feedback signal becomes higher than 4.2 volts (r.m.s.) for 1.0 second when the exposure lamp is on.
- The feedback signal becomes lower than 0.5 volt (r.m.s.) for 1.0 second when the exposure lamp is off.

– Possible Causes –

- Exposure lamp open
- Thermofuse open
- Power Supply/AC Drive Board Defective
- Main board defective
- DC harness defective

3.2 CODE #12 – EXPOSURE LAMP ERROR

– Definition –

- The feedback signal falls below 0.5 volts (r.m.s.) for 1.0 second when the exposure lamp is on.
- The exposure stays on for longer than 15 seconds.

– Possible Causes –

- AC drive board defective
- Main board defective

3.3 CODE #13 – ZERO CROSS SIGNAL ERROR

– Definition –

The CPU does not receive the zero cross signal within 3.0 seconds.

– Possible Causes –

- Main board defective
- Power supply/ac drive board defective
- Zero cross line open
- CN404 on power the supply/ac drive board, or CN114 on the main board is not correctly connected.

3.4 CODE #21 – SCANNER HOME POSITION ERROR

– Definition –

The scanner home position sensor’s output remains LOW (de-actuated) for 12 seconds after the main switch is turned on.

– Possible Causes –

- Scanner home position sensor failure
- Scanner motor defective
- Main board defective
- Power supply/ac drive board defective
- Incorrect scanner drive wire position
- CN402 or CN403 on the power supply/ac drive board, or CN114 on the main board is not correctly connected.

3.5 CODE #22 – SCANNER HOME POSITION ERROR

– Definition –

The scanner home position sensor’s output remains HIGH (actuated) for 1.0 second after the scanner starts.

– Possible Causes –

- Scanner home position sensor failure
- Scanner motor defective
- Main board defective
- Power supply/ac drive board defective
- Defective dc harness
- Incorrect scanner drive wire position
- CN402 or CN403 on the power supply/ac drive board, or CN120 or CN114 on the main board is not correctly connected.

3.6 CODE #28 – LENS HOME POSITION ERROR

– Definition –

The lens home position sensor’s output remains LOW (de-actuated) for 3.5 seconds after the lens moves to the home position.

– Possible Causes –

- Lens home position sensor failure
- Lens drive motor defective
- Main board defective
- Lens drive mechanism defective
- CN120 on the main board is not correctly connected.

3.7 CODE #29 – LENS HOME POSITION ERROR

– Definition –

The lens home position sensor’s output remains HIGH (actuated) for 3.5 seconds after the lens leaves the home position.

– Possible Causes –

- Lens home position sensor failure
- Lens drive motor defective
- Main board defective
- Defective dc harness
- Lens drive mechanism defective
- CN120 on the main board is not correctly connected.

3.8 CODE #2A – 4TH/5TH MIRROR HOME POSITION ERROR

– Definition –

The 4th/5th mirror home position sensor’s output remains HIGH (actuated) for 2.5 seconds after the 4th/5th mirror assembly leaves the home position.

– Possible Causes –

- 4th/5th mirror home position sensor failure
- 4th/5th mirror motor defective
- Main board defective
- 4th/5th mirror drive mechanism defective
- Defective dc harness
- CN123 on the main board is not correctly connected.

3.9 CODE #2B – 4TH/5TH MIRROR HOME POSITION ERROR

– Definition –

The 4th/5th mirror home position sensor’s output remains LOW (de-actuated) for 2.5 seconds after the 4th/5th mirror assembly moves to the home position.

– Possible Causes –

- 4th/5th mirror home position sensor failure
- 4th/5th mirror motor defective
- Main board defective
- 4th/5th mirror drive mechanism defective
- CN123 on the main board is not correctly connected.

3.10 CODE #52 – FUSING LAMP WARM-UP ERROR

– Definition –

The temperature detected by the thermistor does not reach 175°C within 100 seconds after the main switch is turned on.

– Possible Causes –

- Thermistor position error
- Fusing lamp open
- Thermofuse open
- Power supply/ac drive board defective
- Main board defective
- Defective ac harness
- T407 or T408 on the ac drive board is not correctly connected.

3.11 CODE #53 – FUSING LAMP OVERHEAT

– Definition –

The thermistor detects a temperature higher than 230°C for 3 seconds.

– Possible Causes –

- Thermistor short
- Power supply/ac drive board defective
- Main board defective
- Fusing harness shorted

3.12 CODE #55 – FUSING THERMISTOR OPEN

– Definition –

The temperature detected by the thermistor does not detect 2°C within 30 seconds after the main switch is turned on.

– Possible Causes –

- Thermistor open
- Main board defective
- Power supply/ac drive board defective
- Fusing lamp open
- Thermofuse open
- Defective ac harness
- T407 or T408 on the ac drive board is not correctly connected.

3.13 E70 (IN THE MAGNIFICATION INDICATOR) – TONER OVERFLOW

– Definition –

The toner overflow counter has reached the number specified by SP116. The toner overflow sensor turns on (if the optional toner overflow sensor is installed).

– Possible Causes –

- Toner overflow
- Main board defective
- Defective toner overflow sensor (if installed)

4. ELECTRICAL COMPONENT DEFECTS

4.1 SENSORS

Component	Condition	Symptom
Scanner Home Position Sensor	Stays HIGH (CN120-2)	SC code (E22) is displayed.
	Stays LOW (CN120-2)	SC code (E21) is displayed.
Lens Home Position Sensor	Stays HIGH (CN120-5)	SC code (E29) is displayed.
	Stays LOW (CN120-5)	SC code (E28) is displayed.
4th/5th Mirror Home Position Sensor	Stays HIGH (CN122-5)	SC code (E2B) is displayed.
	Stays LOW (CN122-5)	SC code (E2A) is displayed.
Registration Sensor	Stays HIGH (CN103-5)	The "Check Paper Path" indicator (location "A") blinks when a copy is made.
	Stays LOW (CN103-5)	The "Check Paper Path" indicator (location "A") lights when the main switch is turned on.
Exit Sensor	Stays HIGH (CN121-5)	The "Check Paper Path" indicator (location "C") blinks when a copy is made.
	Stays LOW (CN121-5)	The "Check Paper Path" indicator (location "C") lights when the main switch is turned on.
1st or 2nd Paper End Sensor	Stays HIGH (1st: CN104-4) (2nd: CN110-4)	The "Load Paper" indicator lights even when there is paper in the cassette or tray.
	Stays LOW (1st: CN104-4) (2nd: CN110-4)	The "Load Paper" indicator does not light even when the cassette or tray is empty.
Image Density (ID Sensor)	Stays HIGH (CN117-3)	The CPU detects an abnormal ID sensor condition. The ADS or Manual Image Density indicator starts blinking.
	Stays LOW (CN117-3)	

4.2 SWITCHES AND OTHER ELECTRICAL COMPONENTS

Component	Condition	Symptom
Main Switch	OPEN	The copier does not turn on.
	SHORTED	The copier does not turn off.
Cover Safety Switch	OPEN	The copier does not turn on.
	SHORTED	The copier does not turn off when the front or exit cover is opened.
1st Paper Size Switch	OPEN (CN106-4 to 8)	The CPU cannot detect the proper paper size, and misfeeds may occur when a copy is made.
	SHORTED (CN106-4 to 8)	
Manual Feed Table Switch	OPEN (CN104-1 stays HIGH)	The CPU does not detect manual feed mode even when the manual feed table is opened.
	SHORTED (CN104-1 stays LOW)	The "Manual Feed" indicator stays on even when the manual feed table is closed.
2nd Tray Set Switch	OPEN (CN110-1 stays HIGM)	The 2nd tray cannot be selected.
	SHORTED (CN110-1 stays LOW)	The 2nd tray open condition cannot be detected.
Right Cover Switch	OPEN (CN106-1 stays HIGH)	The CPU does not display "U1" even when the right cover is opened.
	SHORTED (CN106-1 stays LOW)	"U1" is displayed even when the right cover is closed.
Exposure Lamp	OPEN	SC Code E11 is displayed.
Fusing Lamp	OPEN	SC Code E52 or E55 is displayed.
Fusing Thermistor	OPEN	SC Code E55 is displayed.
	SHORTED	SC Code E53 is displayed.
Fusing Thermofuse	OPEN	SC Code E52 or E55 is displayed.
Optics Thermofuse	OPEN	SC Code E11 is displayed.

4.3 BLOWN FUSE CONDITION

1) 110 V machine

Component	Location	Symptom
F151 (125V/15A)	Power Supply/AC Drive Board	The copier does not turn on even when the main switch is turned on.

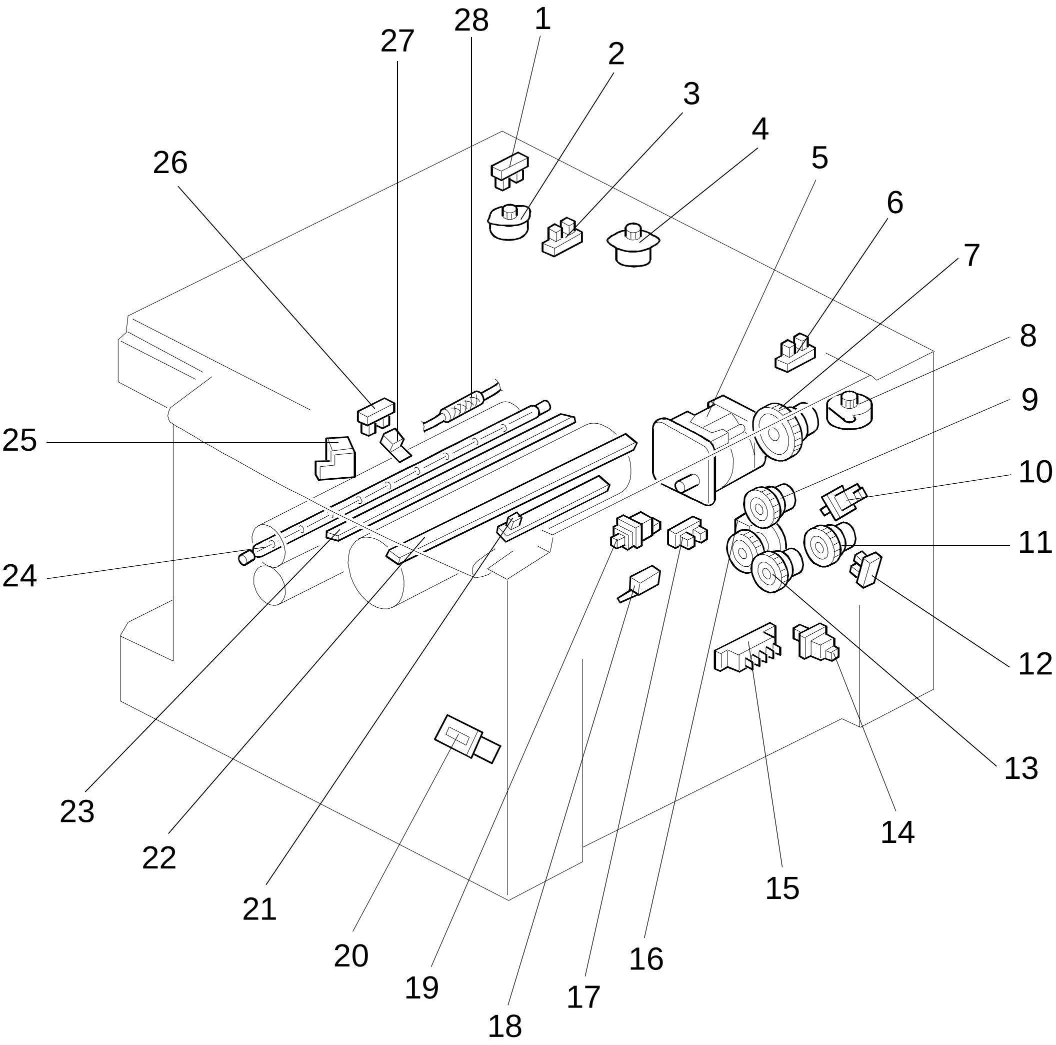
2) 220 V machine

Component	Location	Symptom
F151 (250V/6.3A)	Power Supply/AC Drive Board	The copier does not turn on even when the main switch is turned on.

⚠ CAUTION

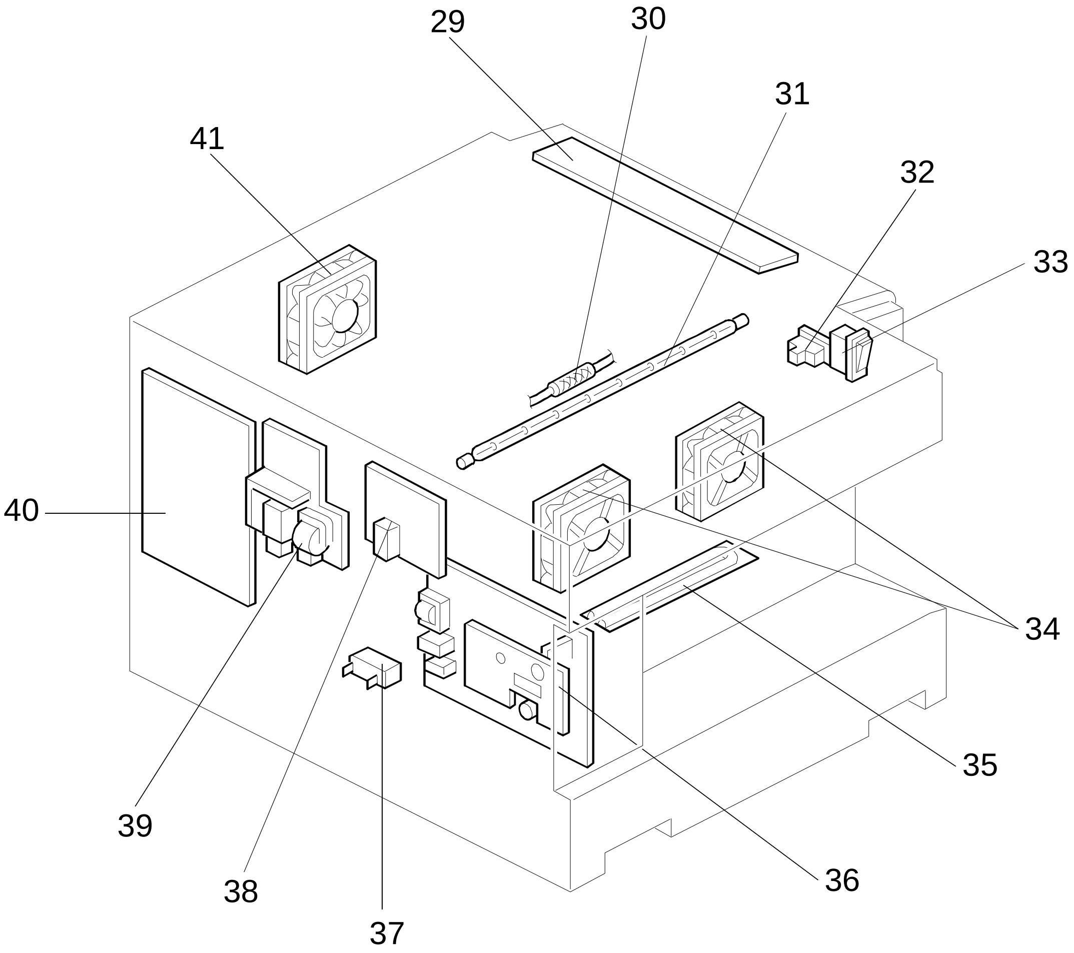
Before replacing the fuse on the power supply/ac drive board, make sure that the power cord is unplugged.

ELECTRICAL COMPONENT LAYOUT (A173)



28
1
27
2
3
4
26
5
6
7
8
25
9
10
11
24
12
13
14
23
15
22
21
16
20
19
17
18

A173S500.wmf

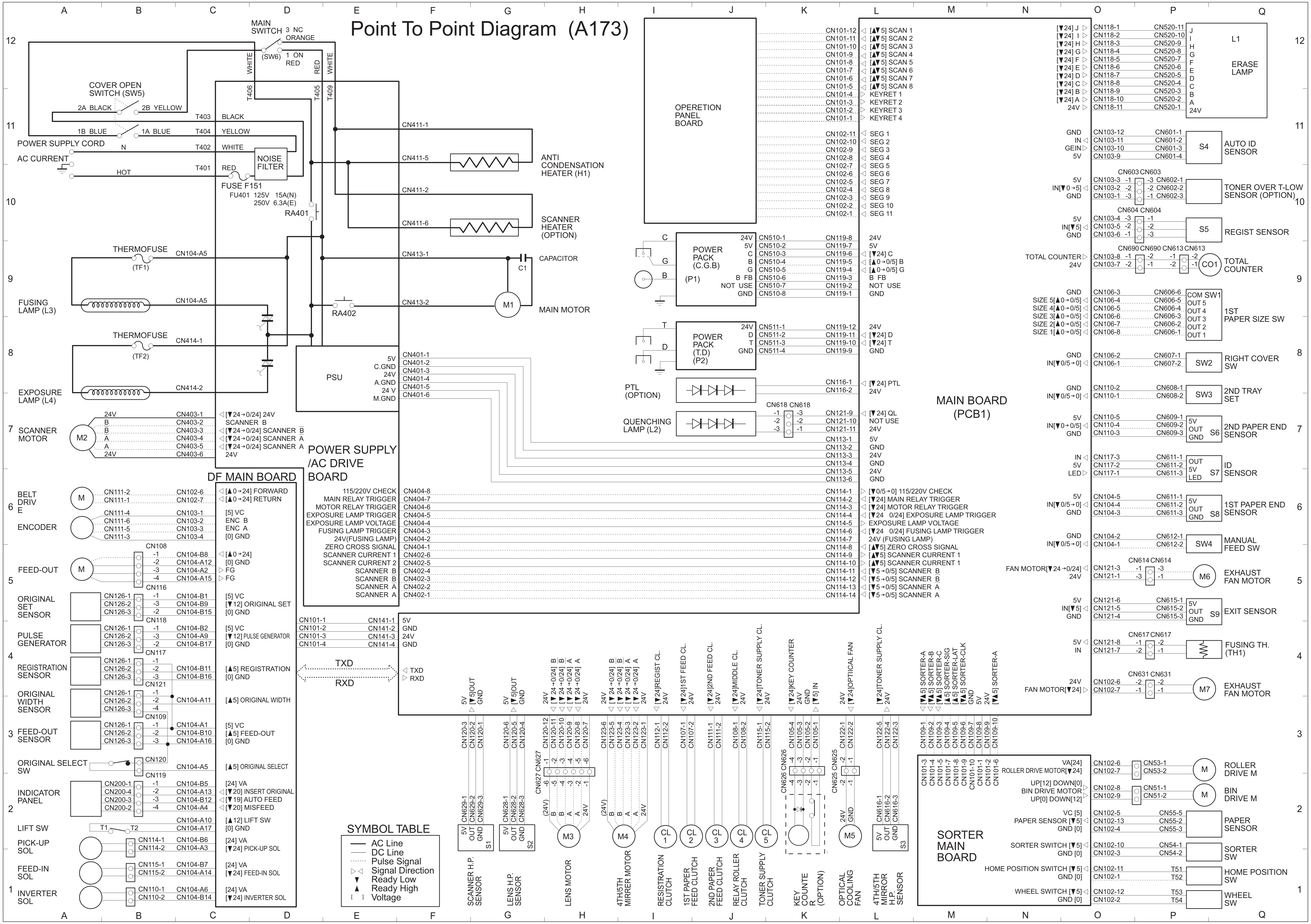

29
30
31
32
33
34
35
36
37
38
39
40
41

A173S501.wmf

Symbol	Name	Index No.	P to P
Motors			
M1	Main Motor	5	G-8
M2	Scanner Motor	4	A-7
M3	Lens Motor	2	H-2
M4	4th/5th Mirror Motor	8	I-2
M5	Optics Cooling Fan Motor	41	L-2
M6 M7	Exhaust Fan Motors	34	P-5 P-4
Clutches			
CL1	Registration Clutch	9	I-2
CL2	1st Paper Feed Clutch	11	I-2
CL3	2nd Paper Feed Clutch	16	J-2
CL4	Relay Roller Clutch	13	J-2
CL5	Toner Supply Clutch	7	K-2
Switches			
SW1	1st Paper Size Switch	15	P-9
SW2	Right Cover Switch	14	P-8
SW3	2nd Tray Set Switch	19	P-7
SW4	Manual Feed Table Switch	10	P-5
SW5	Cover Open Switch	32	B-11
SW6	Main Switch	33	D-12
Sensors			
S1	Scanner Home Position Sensor	1	G-2
S2	Lens Home Position Sensor	3	G-2
S3	4th/5th Mirror Home Position Sensor	6	L-2
S4	ADS Sensor	25	P-11
S5	Registration Sensor	18	P-10
S6	2nd Paper End Sensor	17	P-7
S7	Image Density (ID) Sensor	21	P-6
S8	1st Paper End Sensor	12	P-6
S9	Exit Sensor	26	P-5

Symbol	Name	Index No.	P to P
Printed Circuit Boards			
PCB1	Main Board	40	M-7
PCB2	Power Supply/ AC Drive Board	36	E-7
PCB3	Operation Panel Board	29	J-11
Lamps			
L1	Erase Lamp	22	Q-12
L2	Quenching Lamp	23	J-7
L3	Fusing Lamp	24	B-9
L4	Exposure Lamp	31	B-7
Power Packs			
P1	CC/Grid/Bias Power Pack	38	J-9
P2	TC/SC Power Pack	39	J-8
Heaters			
H1	Anti-condensation Heater	35	G-10
Counters			
CO1	Total Counter	20	Q-9
Others			
C1	Main Motor Capacitor	37	G-9
TF1	Fusing Thermofuse	28	B-9
TF2	Optics Thermofuse	30	B-7
TH1	Fusing Thermistor	27	Q-4

Point To Point Diagram (A173)



A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
12
11
10
9
8
7
6
5
4
3
2
1
MAIN SWITCH (SW6)
3 NC ORANGE
1 ON RED
WHITE
RED
T406
T405
T409
COVER OPEN SWITCH (SW5)
2A BLACK
2B YELLOW
1B BLUE
1A BLUE
T403 BLACK
T404 YELLOW
T402 WHITE
T401 RED
POWER SUPPLY CORD
N
AC CURRENT
HOT
NOISE FILTER
FUSE F151
FU401 125V 15A(N) 250V 6.3A(E)
RA401
RA402
CN411-1
CN411-5
CN411-2
CN411-6
ANTI CONDENSATION HEATER (H1)
SCANNER HEATER (OPTION)
CN413-1
CN413-2
CAPACITOR
C1
M1
MAIN MOTOR
THERMOFUSE (TF1)
CN104-A5
FUSING LAMP (L3)
THERMOFUSE (TF2)
CN414-1
CN414-2
EXPOSURE LAMP (L4)
PSU
5V
C.GND
24V
A.GND
24 V
M.GND
CN401-1
CN401-2
CN401-3
CN401-4
CN401-5
CN401-6
SCANNER MOTOR
M2
24V CN403-1 [▼24→0/24] 24V
B CN403-2 SCANNER B
B CN403-3 [▼24→0/24] SCANNER B
A CN403-4 [▼24→0/24] SCANNER A
A CN403-5 [▼24→0/24] SCANNER A
24V CN403-6 24V
POWER SUPPLY /AC DRIVE BOARD
DF MAIN BOARD
115/220V CHECK CN404-8
MAIN RELAY TRIGGER CN404-7
MOTOR RELAY TRIGGER CN404-6
EXPOSURE LAMP TRIGGER CN404-5
EXPOSURE LAMP VOLTAGE CN404-4
FUSING LAMP TRIGGER CN404-3
24V(FUSING LAMP) CN404-2
ZERO CROSS SIGNAL CN404-1
SCANNER CURRENT 1 CN402-6
SCANNER CURRENT 2 CN402-5
SCANNER B CN402-4
SCANNER B CN402-3
SCANNER A CN402-2
SCANNER A CN402-1
BELT DRIVE
CN111-2 CN102-6 [▲0→24] FORWARD
CN111-1 CN102-7 [▲0→24] RETURN
ENCODER
CN111-4 CN103-1 [5] VC
CN111-6 CN103-2 ENC B
CN111-5 CN103-3 ENC A
CN111-3 CN103-4 [0] GND
FEED-OUT
CN108
-1 CN104-B8 [▲0→24]
-2 CN104-A12 [0] GND
-3 CN104-A2 FG
-4 CN104-A15 FG
CN116
ORIGINAL SET SENSOR
CN126-1 -1 CN104-B1 [5] VC
CN126-2 -3 CN104-B9 [▼12] ORIGINAL SET
CN126-3 -2 CN104-B15 [0] GND
CN118
PULSE GENERATOR
CN126-1 -1 CN104-B2 [5] VC
CN126-2 -3 CN104-A9 [▼12] PULSE GENERATOR
CN126-3 -2 CN104-B17 [0] GND
CN117
REGISTRATION SENSOR
CN126-1 -1
CN126-2 -2 CN104-B11 [▲5] REGISTRATION
CN126-3 -3 CN104-B16 [0] GND
CN121
ORIGINAL WIDTH SENSOR
CN126-1 -1
CN126-2 -2 CN104-A11 [▲5] ORIGINAL WIDTH
CN126-3 -4
CN109
FEED-OUT SENSOR
CN126-1 -1 CN104-A1 [5] VC
CN126-2 -2 CN104-B10 [▲5] FEED-OUT
CN126-3 -3 CN104-A16 [0] GND
ORIGINAL SELECT SW
CN120
CN104-A5 [▲5] ORIGINAL SELECT
CN119
INDICATOR PANEL
CN200-1 -1 CN104-B5 [24] VA
CN200-4 -2 CN104-A13 [▼20] INSERT ORIGINAL
CN200-3 -3 CN104-B12 [▼19] AUTO FEED
CN200-2 -4 CN104-A4 [▼20] MISFEED
LIFT SW
T1 T2
CN104-A10 [▲12] LIFT SW
CN104-A17 [0] GND
PICK-UP SOL
CN114-1 CN104-B6 [24] VA
CN114-2 CN104-A3 [▼24] PICK-UP SOL
FEED-IN SOL
CN115-1 CN104-B7 [24] VA
CN115-2 CN104-A14 [▼24] FEED-IN SOL
INVERTER SOL
CN110-1 CN104-A6 [24] VA
CN110-2 CN104-B14 [▼24] INVERTER SOL
CN101-1 CN141-1 5V
CN101-2 CN141-2 GND
CN101-3 CN141-3 24V
CN101-4 CN141-4 GND
TXD
RXD
OPERETION PANEL BOARD
CN101-12 [▲▼5] SCAN 1
CN101-11 [▲▼5] SCAN 2
CN101-10 [▲▼5] SCAN 3
CN101-9 [▲▼5] SCAN 4
CN101-8 [▲▼5] SCAN 5
CN101-7 [▲▼5] SCAN 6
CN101-6 [▲▼5] SCAN 7
CN101-5 [▲▼5] SCAN 8
CN101-4 KEYRET 1
CN101-3 KEYRET 2
CN101-2 KEYRET 3
CN101-1 KEYRET 4
CN102-11 SEG 1
CN102-10 SEG 2
CN102-9 SEG 3
CN102-8 SEG 4
CN102-7 SEG 5
CN102-6 SEG 6
CN102-5 SEG 7
CN102-4 SEG 8
CN102-3 SEG 9
CN102-2 SEG 10
CN102-1 SEG 11
POWER PACK (C.G.B) (P1)
24V CN510-1 CN119-8 24V
5V CN510-2 CN119-7 5V
C CN510-3 CN119-6 [▼24] C
B CN510-4 CN119-5 [▲0→0/5] B
G CN510-5 CN119-4 [▲0→0/5] G
B FB CN510-6 CN119-3 B FB
NOT USE CN510-7 CN119-2 NOT USE
GND CN510-8 CN119-1 GND
POWER PACK (T.D) (P2)
24V CN511-1 CN119-12 24V
D CN511-2 CN119-11 [▼24] D
T CN511-3 CN119-10 [▼24] T
GND CN511-4 CN119-9 GND
PTL (OPTION)
CN116-1 [▼24] PTL
CN116-2 24V
QUENCHING LAMP (L2)
CN618 CN618
CN121-9 [▼24] QL
CN121-10 NOT USE
CN121-11 24V
CN113-1 5V
CN113-2 GND
CN113-3 24V
CN113-4 GND
CN113-5 24V
CN113-6 GND
CN114-1 [▼0/5→0] 115/220V CHECK
CN114-2 [▼24] MAIN RELAY TRIGGER
CN114-3 [▼24] MOTOR RELAY TRIGGER
CN114-4 [▼24 0/24] EXPOSURE LAMP TRIGGER
CN114-5 EXPOSURE LAMP VOLTAGE
CN114-6 [▼24 0/24] FUSING LAMP TRIGGER
CN114-7 24V (FUSING LAMP)
CN114-8 [▲▼5] ZERO CROSS SIGNAL
CN114-9 [▲▼5] SCANNER CURRENT 1
CN114-10 [▲▼5] SCANNER CURRENT 1
CN114-11 [▼5→0/5] SCANNER B
CN114-12 [▼5→0/5] SCANNER B
CN114-13 [▼5→0/5] SCANNER A
CN114-14 [▼5→0/5] SCANNER A
MAIN BOARD (PCB1)
[▼24] J CN118-1 CN520-11
[▼24] I CN118-2 CN520-10
[▼24] H CN118-3 CN520-9
[▼24] G CN118-4 CN520-8
[▼24] F CN118-5 CN520-7
[▼24] E CN118-6 CN520-6
[▼24] D CN118-7 CN520-5
[▼24] C CN118-8 CN520-4
[▼24] B CN118-9 CN520-3
[▼24] A CN118-10 CN520-2
24V CN118-11 CN520-1
L1
ERASE LAMP
GND CN103-12 CN601-1
IN CN103-11 CN601-2
GEIN CN103-10 CN601-3
5V CN103-9 CN601-4
S4
AUTO ID SENSOR
CN603 CN603
5V CN103-3 CN602-1
IN[▼0→5] CN103-2 CN602-2
GND CN103-1 CN602-3
TONER OVER T-LOW SENSOR (OPTION)
CN604 CN604
5V CN103-4
IN[▼5] CN103-5
GND CN103-6
S5
REGIST SENSOR
CN690 CN690 CN613 CN613
TOTAL COUNTER CN103-8
24V CN103-7
CO1
TOTAL COUNTER
GND CN106-3 CN606-6 COM SW1
SIZE 5[▲0→0/5] CN106-4 CN606-5 OUT 5
SIZE 4[▲0→0/5] CN106-5 CN606-4 OUT 4
SIZE 3[▲0→0/5] CN106-6 CN606-3 OUT 3
SIZE 2[▲0→0/5] CN106-7 CN606-2 OUT 2
SIZE 1[▲0→0/5] CN106-8 CN606-1 OUT 1
1ST PAPER SIZE SW
GND CN106-2 CN607-1
IN[▼0/5→0] CN106-1 CN607-2
SW2
RIGHT COVER SW
GND CN110-2 CN608-1
IN[▼0/5→0] CN110-1 CN608-2
SW3
2ND TRAY SET
5V CN110-5 CN609-1
IN[▼0→0/5] CN110-4 CN609-2
GND CN110-3 CN609-3
S6
2ND PAPER END SENSOR
IN CN117-3 CN611-1
5V CN117-2 CN611-2
LED CN117-1 CN611-3
S7
ID SENSOR
5V CN104-5 CN611-1
IN[▼5→0/5] CN104-4 CN611-2
GND CN104-3 CN611-3
S8
1ST PAPER END SENSOR
GND CN104-2 CN612-1
IN[▼0/5→0] CN104-1 CN612-2
SW4
MANUAL FEED SW
CN614 CN614
FAN MOTOR[▼24→0/24] CN121-3
24V CN121-1
M6
EXHAUST FAN MOTOR
5V CN121-6 CN615-1
IN[▼5] CN121-5 CN615-2
GND CN121-4 CN615-3
S9
EXIT SENSOR
CN617 CN617
5V CN121-8
IN CN121-7
FUSING TH. (TH1)
CN631 CN631
24V CN102-6
FAN MOTOR[▼24] CN102-7
M7
EXHAUST FAN MOTOR
5V [▼5]OUT GND
CN120-3 CN120-2 CN120-1
CN629-1 CN629-2 CN629-3
S1
SCANNER H.P. SENSOR
CN120-6 CN120-5 CN120-4
CN628-1 CN628-2 CN628-3
S2
LENS H.P. SENSOR
24V [▼24→0/24] B [▼24→0/24] B [▼24→0/24] A [▼24→0/24] A 24V
CN120-12 CN120-11 CN120-10 CN120-9 CN120-8 CN120-7
CN627 CN627
M3
LENS MOTOR
CN123-6 CN123-5 CN123-4 CN123-3 CN123-2 CN123-1
M4
4TH/5TH MIRROR MOTOR
[▼24]REGIST CL. 24V
CN112-1 CN112-2
CL 1
REGISTRATION CLUTCH
[▼24]1ST FEED CL. 24V
CN107-1 CN107-2
CL 2
1ST PAPER FEED CLUTCH
[▼24]2ND FEED CL. 24V
CN111-1 CN111-2
CL 3
2ND PAPER FEED CLUTCH
[▼24]MIDDLE CL. 24V
CN108-1 CN108-2
CL 4
RELAY ROLLER CLUTCH
[▼24]TONER SUPPLY CL. 24V
CN115-1 CN115-2
CL 5
TONER SUPPLY CLUTCH
[▼24]KEY COUNTER 24V GND [▼5] IN
CN105-4 CN105-3 CN105-2 CN105-1
CN626 CN626
KEY COUNTER (OPTION)
24V [▼24]OPTICAL FAN
CN122-1 CN122-2
CN625 CN625
M5
OPTICAL COOLING FAN
[▼24]TONER SUPPLY CL. 24V
CN122-5 CN122-4 CN122-3
CN616-1 CN616-2 CN616-3
S3
4TH/5TH MIRROR H.P. SENSOR
[▲▼5] SORTER-A
[▲▼5] SORTER-B
[▲▼5] SORTER-C
[▲▼5] SORTER-SIG
[▲▼5] SORTER-LAT
[▲▼5] SORTER-CLK
GND
5V
24V
[▲▼5] SORTER-A
CN109-1 CN109-2 CN109-3 CN109-4 CN109-5 CN109-6 CN109-7 CN109-8 CN109-9 CN109-10
CN101-3 CN101-4 CN101-5 CN101-7 CN101-8 CN101-9 CN101-10 CN101-1 CN101-2 CN101-6
SORTER MAIN BOARD
VA[24] CN102-6 CN53-1
ROLLER DRIVE MOTOR[▼24] CN102-7 CN53-2
ROLLER DRIVE M
UP[12] DOWN[0]
BIN DRIVE MOTOR CN102-8 CN51-1
UP[0] DOWN[12] CN102-9 CN51-2
BIN DRIVE M
VC [5] CN102-5 CN55-5
PAPER SENSOR [▼5] CN102-13 CN55-2
GND [0] CN102-4 CN55-3
PAPER SENSOR
SORTER SWITCH [▼5] CN102-10 CN54-1
GND [0] CN102-3 CN54-2
SORTER SW
HOME POSITION SWITCH [▼5] CN102-11 T51
GND [0] CN102-1 T52
HOME POSITION SW
WHEEL SWITCH [▼5] CN102-12 T53
GND [0] CN102-2 T54
WHEEL SW
SYMBOL TABLE
AC Line
DC Line
Pulse Signal
▷◁ Signal Direction
▼ Ready Low
▲ Ready High
[ ] Voltage

SECTION 1

OVERALL MACHINE INFORMATION

1. SPECIFICATIONS

Configuration:	Desktop
Copy Process:	Dry electrostatic transfer system
Originals:	Sheet/Book
Original Size:	Maximum A3/11" x 17"
Copy Paper Size:	Maximum A3/11" x17" (Paper trays) Minimum A5/8 1/2" x 5 1/2" sideways (Paper trays) A4/11" x 8 1/2" sideways (LCT) A6/5 1/2" x 8 1/2" lengthwise (By-pass)
Duplex Copying:	Maximum A3/11" x 17" Minimum A5/8 1/2" x 5 1/2" (sideways)
Copy Paper Weight:	Paper tray: 52 ~ 128 g/m^2, 14 ~34 lb (A153, A155, and A156 copiers) 64 ~ 90 g/m^2, 17 ~ 24 lb (A157, A159, and A160 copiers) By-pass: 52 ~ 157 g/m^2, 14 ~42 lb LCT: 52 ~ 128 g/m^2, 14 ~ 34 lb Duplex copying: 64 ~ 105 g/m^2, 17 ~ 24 lb
Reproduction Ratios:	4 Enlargement and 6 Reduction

	A4/A3 Version	**LT/DLT Version**
Enlargement	200%	200%
	141%	155%
	122%	129%
	115%	121%
Full size	100%	100%
Reduction	93%	93%
	82%	85%
	75%	77%
	71%	74%
	65%	65%
	50%	50%

Power Source:	120V/60Hz:
	More than 12 A (for North America)
	220V ~ 240V/50Hz:
	More than 7 A (for Europe)
	220V/50Hz:
	More than 7 A (for Asia)
	110V/60Hz:
	More than 14 A (for Taiwan)
	220V/60Hz:
	More than 7 A (for Saudi Arabia, Philippines)

Power Consumption:

		A153, A155, and A156 copiers		**A157, A159, and A160 copiers**	
		Copier Only	**Full System**	**Copier Only**	**Full System**
Maximum		1.45 KW	1.50 KW	1.45 KW	1.50 KW
Copying		1.00 KW	1.00 KW	0.80 KW	0.80 KW
Warm-up		0.90 KW	0.92 KW	0.90 KW	0.92 KW
Stand-by		0.16 KW	0.19 KW	0.15 KW	0.17 KW
Energy Saver	1	0.15 KW	0.17 KW	0.14 KW	0.16 KW
	2	0.13 KW	0.15 KW	0.12 KW	0.13 KW
	3	0.12 KW	0.14 KW	0.09 KW	0.10 KW
	4	0.11 KW	0.12 KW	0.07 KW	0.08 KW
	5	0.09 KW	0.11 KW	0.05 KW	0.06 KW
	6	0.07 KW	0.09 KW	–	–
Auto Off		0.02 KW	0.04 KW	0.02 KW	0.04 KW

NOTE: 1) Full System: Copier + ADF + Paper Tray Unit + 20 Bin S/S
2) Energy Saver: See SP1-105-002
3) Auto Off: See SP5-305

Noise Emission:

	A153, A155, and A156 copiers		**A157, A159, and A160 copiers**	
	Copier Only	**Full System***	**Copier Only**	**Full System***
1. Sound Power Level				
Copying	66 dB(A)	68 dB(A)	61 dB(A)	67 dB(A) (LWA)
Warm-up	41 dB(A)	41 dB(A)	39 dB(A)	40 dB(A) (LWA)
Stand-by	41 dB(A)	41 dB(A)	39 dB(A)	40 dB(A) (LWA)
2. Sound Pressure Level at the operator position				
Copying	58 dB(A)	57 dB(A)	54 dB(A)	56 dB(A) (LPA)
Warm-up	33 dB(A)	27 dB(A)	32 dB(A)	27 dB(A) (LPA)
Stand-by	33 dB(A)	27 dB(A)	32 dB(A)	27 dB(A) (LPA)

NOTE: The above measurements are to be made according to ISO 7779.
* : Full System: Copier + ADF + Paper Tray Unit +10 Bin S/S.

Dimensions:

	Width	**Depth**	**Height**
A153 copier	1030 mm (40.6")	655 mm (25.8")	606 mm (23.9")
A157 copier	900 mm (35.5")	655 mm (25.8")	606 mm (23.9")
A155 and A156 copiers	1258 mm (49.6")	655 mm (25.8")	606 mm (23.9")
A159 and A160 copiers	1128 mm (44.5")	655 mm (25.8")	606 mm (23.9")

Measurement Conditions
1) With by-pass feed table closed
2) With platen cover and copy tray attached
3) With LCT cover closed

Weight:

	Weight
A153 copier	About 70 kg (154.2 lb)
A155 copier	About 78 kg (171.9 lb)
A156 copier	About 82 kg (180.7 lb)
A157 copier	About 67 kg (147.7 lb)
A159 copier	About 75 kg (165.4 lb)
A160 copier	About 80 kg (176.4 lb)

Zoom: From 50% to 200% in 1% steps

Copying Speed (copies/minute):

	A4 sideways/ 11" x 81/2"	**A3/11" x 17"**	**B4/81/2" x 14"**
A153, A155, and A156 copiers	35	20/19	22
A157, A159, and A160 copiers	27	15/14	17

Warm-Up Time A153, A155, and A156 copiers:
Less than 110 seconds (20°C)
A157, A159, and A160 copiers:
Less than 80 seconds (20°C)

First Copy Time:

Paper Feed Station	**A4/11" x 81/2" (sideways)**	
	A153, A155, and A156 copiers	**A157, A159, and A160 copiers**
1st Tray	5.2 s (except for A156)	5.9 s (except for A160)
2nd Tray	5.7 s	6.6 s
By-pass	4.8 s	5.6 s
LCT	5.0 s	5.9 s

Note: In A156 and A160 copiers, the 2nd tray in the above table is called the 1st tray (see Installation - Paper Feed Station Definition).

Copy Number Input:	Ten-key pad, 1 to 999 (count up or count down)
Manual Image Density Selection:	7 steps
Automatic Reset:	1 minute is the standard setting; it can be changed to a maximum of 999 seconds or no auto reset by SP mode.

Copy Paper Capacity:

	Paper Tray	**By-pass Feed**	**LCT**
A153 copier	About 500 sheets x2	About 40 sheets	–
A155 copier	About 500 sheets x2	About 40 sheets	About 1000 sheets
A156 copier	About 500 sheets x1	About 40 sheets	About 1000 sheets
A157 copier	About 250 sheets x2	About 40 sheets	–
A159 copier	About 250 sheets x2	About 40 sheets	About 1000 sheets
A160 copier	About 250 sheets x1	About 40 sheets	About 1000 sheets

Duplex Tray Capacity [A156/A160]:	50 sheets (30 sheets for A3/11"x17" 81 ~ 105g/m^2, 21.5 ~ 27.9 lb paper)
Toner Replenishment:	Cartridge exchange (415 g/cartridge)

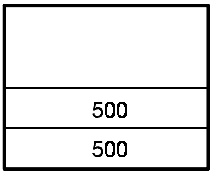
Optional Equipment:

- Platen cover
- Document feeder
- Paper tray unit with two paper trays
- Paper tray unit with three paper trays
- 10 bin micro sorter
- 20 bin mini sorter
- 10 bin sorter stapler
- 20 bin sorter stapler
- Sorter adapter (required when installing 20 bin mini sorter, 10 bin sorter stapler, or 20 bin sorter stapler for A157, A159, and A160 copiers)
- Key counter
- Tray heater
- Optical anti-condensation heater
- Original length sensor for 11" x 15" size paper (only for LT/DLT version)
- ADS sensor for particular types of red original

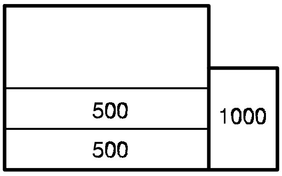
2. MACHINE CONFIGURATION

2.1 COPIER

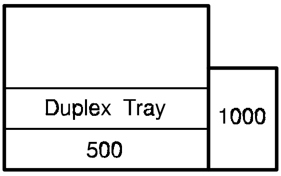
A153 copier



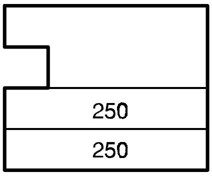
A155 copier


500
500
1000

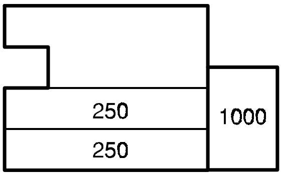
A156 copier


Duplex Tray
500
1000

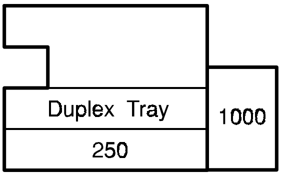
A157 copier



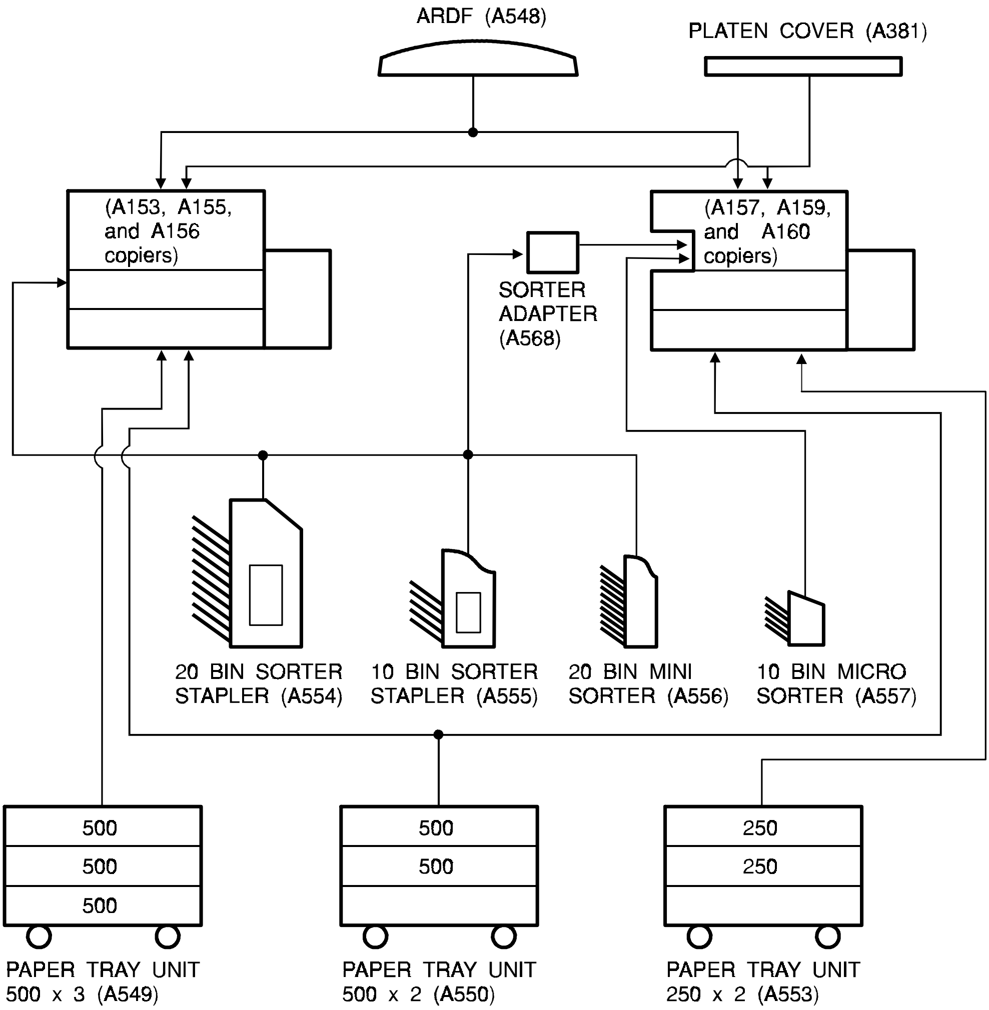
A159 copier


250
250
1000

A160 copier

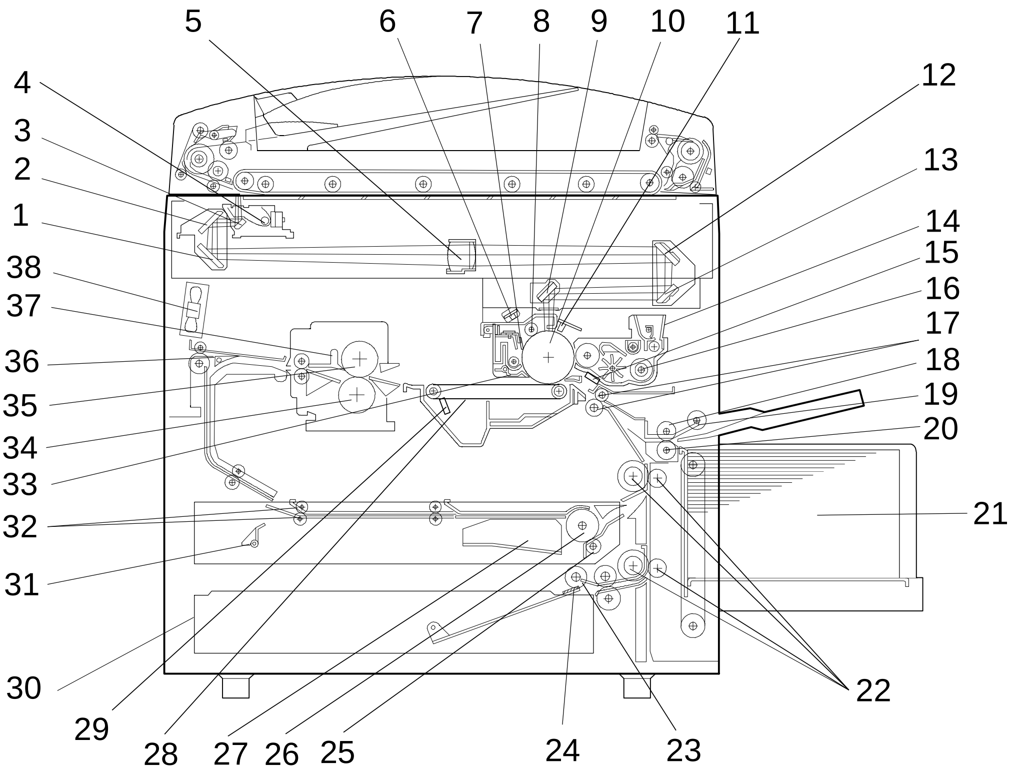

Duplex Tray
250
1000

2.2 OPTIONAL EQUIPMENT


ARDF (A548)
PLATEN COVER (A381)
(A153, A155, and A156 copiers)
(A157, A159, and A160 copiers)
SORTER ADAPTER (A568)
20 BIN SORTER STAPLER (A554)
10 BIN SORTER STAPLER (A555)
20 BIN MINI SORTER (A556)
10 BIN MICRO SORTER (A557)
500
500
500
500
500
250
250
PAPER TRAY UNIT 500 x 3 (A549)
PAPER TRAY UNIT 500 x 2 (A550)
PAPER TRAY UNIT 250 x 2 (A553)

3. MECHANICAL COMPONENT LAYOUT

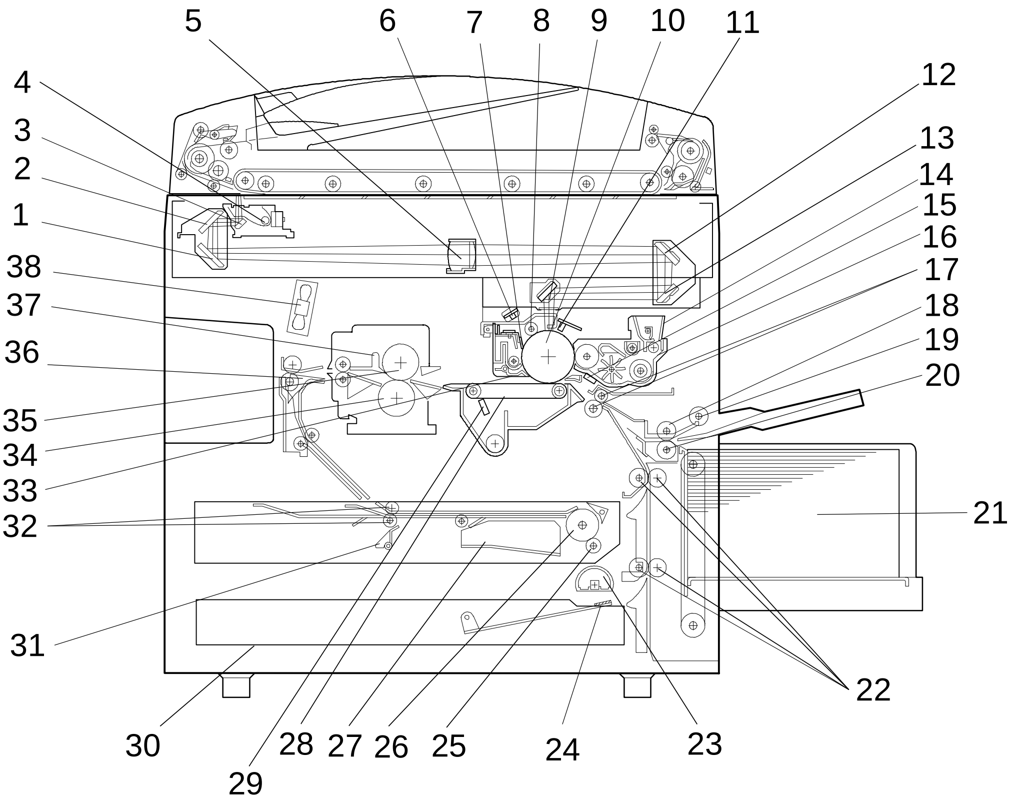
– A156 copier –


5
6
7
8
9
10
11
4
12
3
2
13
1
14
15
38
16
37
17
36
18
19
35
20
34
33
21
32
31
30
22
29
28
27
26
25
24
23

NOTE: 1. The A153 copier is the same as the A156 copier except that the A153 does not have a duplex tray or an LCT.

2. The A155 copier is the same as the A156 copier except that the A155 does not have a duplex tray.

– A160 copier –


5
6
7
8
9
10
11
4
3
2
1
12
13
14
15
16
17
18
19
20
38
37
36
35
34
33
32
31
21
22
30
28
27
26
25
24
23
29

NOTE: 1. The A157 copier is the same as the A160 copier except that the A157 does not have a duplex tray or an LCT.

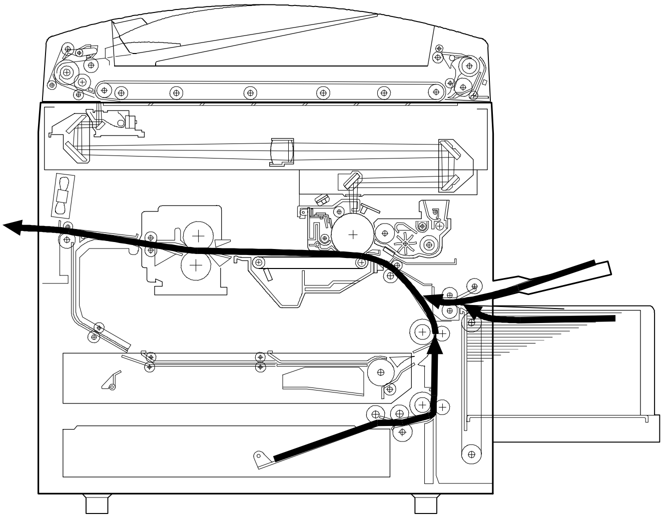
2. The A159 copier is the same as the A160 copier except that the A159 does not have a duplex tray.

1. 3rd Mirror
2. 2nd Mirror
3. 1st Mirror
4. Exposure Lamp
5. Lens
6. Quenching Lamp
7. Drum Cleaning Blade
8. Drum Charge Roller
9. 6th Mirror
10. OPC Drum
11. Erase Lamp
12. 4th Mirror
13. 5th Mirror
14. Toner Supply Unit
15. Pre-transfer Lamp
16. Development Unit
17. Registration Rollers
18. Feed Roller
19. Pick-up Roller
20. Separation Roller
21. Large Capacity Tray
22. Vertical Transport Rollers
23. Paper Feed Roller
    The roller for A153/A155/A156 copiers is different from that for A157/159/160 copiers.
24. Friction Pad
25. Duplex Friction Roller
26. Duplex Feed Roller
27. Jogger Fence
28. Transfer Belt
29. Transfer Belt Cleaning Blade
30. Lower Paper Tray
31. End Fence
32. Entrance Rollers
33. Pick-off Pawls
34. Pressure Roller
35. Hot Roller
36. Junction Gate
37. Hot Roller Strippers
38. Transport Fan

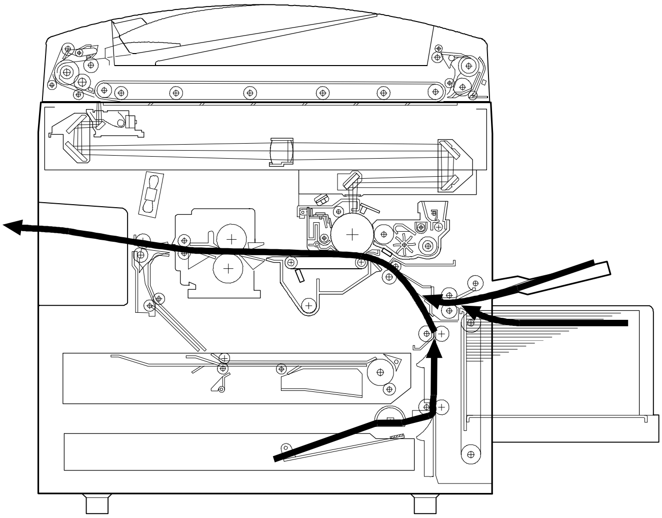
4. PAPER PATH

4.1 NORMAL COPYING

– A156 copier –

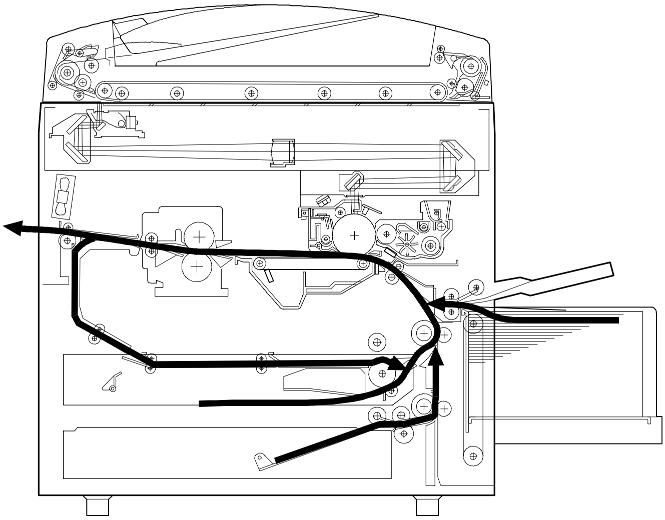


–A160 copier –

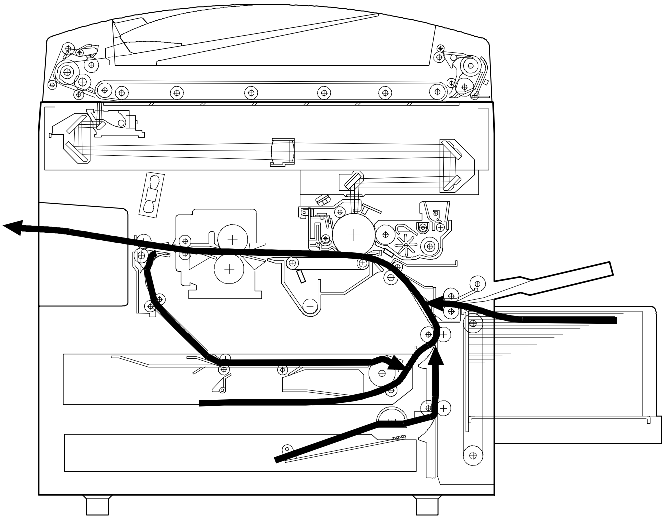


4.2 DUPLEX COPYING

– A156 copier –



– A160 copier –



5. ELECTRICAL COMPONENT DESCRIPTIONS

Refer to the electrical component layout and the point to point diagram on the waterproof paper in the pocket for symbols and index numbers.

Symbol	Index No.	Description	Note
Printed Circuit Boards			
PCB1	14	Main Control	Controls all copier functions both directly or through other control boards.
PCB2	12	AC Drive	Provides ac power to the exposure lamp and fusing lamps.
PCB3	11	DC Power Supply	Provides dc power.
PCB4	96	Main Motor Control	Controls the rotation of the main motor.
PCB5	1	CB High Voltage Supply	Supplies high voltage to the drum charge roller and development roller.
PCB6	55	T High Voltage Supply	Supplies high voltage to the transfer belt.
PCB7	3	Operation Panel	Controls the LED matrix, and monitors the key matrix.
PCB8	8	Noise Filter (220 ~ 240 V machines only)	Removes electrical noise.
PCB9	63	Duplex Control (Duplex machines only)	Controls the operation of the duplex tray.
PCB10	6	Liquid Crystal Display (A156 machines only)	Controls the guidance display and displays guidance for machine operation.
PCB11	102	LCT Interface (LCT machines only)	Interfaces the LCT control signal between the main board and the LCT.
Motors			
M1	88	Main	Drives the main unit components.
M2	79	Toner Bottle Drive	Rotates the toner bottle to supply toner to the toner supply unit.
M3	97	Upper Tray Lift (A153/A155 machines only)	Raises the bottom plate in the upper paper tray.
M4	86	Lower Tray Lift (A153/A155/A156 machines only)	Raises the bottom plate in the lower paper tray.
M5	99	LCT Lift (LCT machines only)	Lifts up and lowers the LCT bottom plate.
M6	94	Optics Cooling Fan 1	Removes heat from the optics unit.
M7	95	Optics Cooling Fan 2 (A153/A155/A156 machines only)	Removes heat from the optics unit.
M8	89	Exhaust Fan 1	Removes the heat from around the fusing unit.
M9	90	Exhaust Fan 2 (A153/A155/A156 machines only)	Removes the heat from around the fusing unit.

Symbol	Index No.	Description	Note
M10	92	Scanner Drive	Drives the 1st and 2nd scanners (dc stepper motor).
M11	78	3rd Scanner Drive	Drives the 3rd scanner (dc stepper motor).
M12	87	Lens Vertical Drive	Shifts the lens vertical position.
M13	77	Lens Horizontal Drive	Shifts the lens horizontal position.
M14	58	Duplex Feed (Duplex machines only)	Drives the feed roller and moves the bottom plate up and down.
M15	61	End Fence Jogger (Duplex machines only)	Drives the end fence jogger to square the paper stack.
M16	60	Side Fence Jogger (Duplex machines only)	Drives the side fence jogger to square the paper stack.
Sensors			
S1	27	By-pass Feed Paper Width	Informs the CPU what width paper is in the by-pass feed table.
S2	31	By-pass Feed Paper End	Informs the CPU that there is no paper in the by-pass tray.
S3	51	Upper Tray Paper End (Non-duplex machines only)	Informs the CPU when the upper paper tray runs out of paper.
S4	107	Upper Relay	Detects the leading edge of paper from the upper tray to determine the stop timing of the upper paper feed clutch, and detects misfeeds.
S5	29	Upper Tray Upper Limit (A153/A155 machines only)	Detects the height of the paper stack in the upper paper tray to stop the upper tray lift motor.
S6	52	Lower Tray Paper End	Informs the CPU when the lower paper tray runs out of paper.
S7	106	Lower Relay	Detects the leading edge of paper from the lower paper tray to determine the stop timing of the lower paper feed clutch, and detects misfeeds.
S8	30	Lower Tray Upper Limit (A153/A155/A156 machines only)	Detects the height of the paper stack in the lower paper tray to stop the lower tray lift motor.
S9	100	LCT Lower Limit (LCT machines only)	Sends a signal to the CPU to stop lowering the LCT bottom plate.
S10	26	LCT Paper End (LCT machines only)	Informs the CPU when the LCT runs out of paper.
S11	28	LCT Upper Limit (LCT machines only)	Sends a signal to the CPU to stop lifting the LCT bottom plate.

Symbol	Index No.	Description	Note
S12	28	Registration	Detects the leading edge of the copy paper to determine the stop timing of the paper feed clutch, and detects misfeeds.
S13	50	Image Density (ID)	Detects the density of various patterns on the drum during process control.
S14	53	Toner Density (TD)	Detects the amount of toner inside the development unit.
S15	39	Lens Horizontal HP	Informs the CPU that the lens is at the horizontal home position.
S16	20	Lens Vertical HP	Informs the CPU that the lens is at the full-size position.
S17	15	Scanner HP	Informs the CPU when the 1st and 2nd scanners are at the home position.
S18	24	3rd Scanner HP	Informs the CPU when the 3rd scanner is at the home position.
S19	21	Original Length-2	Detects the length of the original. This is one of the APS (Auto Paper Select) sensors.
S20	45	Fusing Exit	Detects misfeeds.
S21	16	Platen Cover	Informs the CPU whether the platen cover is up or down (related to APS/ARE functions). ARE: Auto Reduce and Enlarge
S22	54	Toner End	Instructs the CPU to add toner to the toner supply unit, and detects toner end conditions.
S23	43	Auto Response	Returns the operation panel display and exits from the energy saver mode.
S24	23	Transfer Belt Contact HP	Informs the CPU of the current position of both the transfer belt unit and the drum charge roller unit.
S25	13	Auto Image Density (ADS Sensor)	Detects the background density of each original in ADS mode.
S26	44	Original Width	Detects the width of the original. This is one of the APS (Auto Paper Select) sensors.
S27	19	Original Length-1	Detects the length of the original. This is one of the APS (Auto Paper Select) sensors.
S28	56	Duplex Paper End (Duplex machines only)	Detects paper in the duplex tray.
S29	57	Duplex Turn (Duplex machines only)	Detects the trailing edge of the copy paper to determine the jogging timing, and detects misfeeds.
S30	62	Duplex Entrance (Duplex machines only)	Detects misfeeds.
S31	59	Side Fence Jogger HP (Duplex machines only)	Detects the home position of the duplex side fence jogger.
S32	64	End Fence Jogger HP (Duplex machines only)	Detects the home position of the duplex end fence jogger.

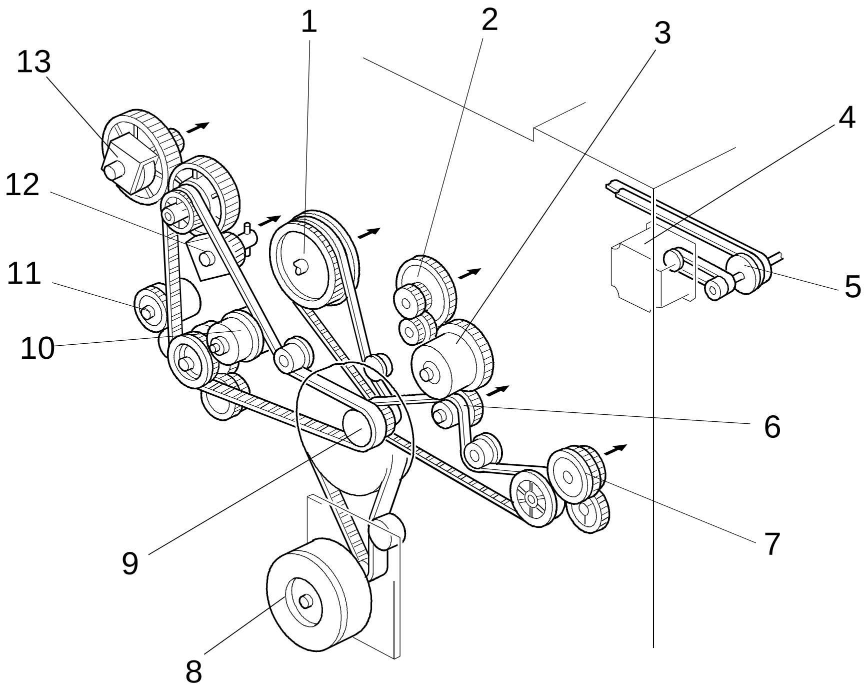
Symbol	Index No.	Description	Note
S33	22	Original Length (Option for N. American models)	Detects original length for 11" x 15" paper.
Switches			
SW1	33	By-pass Feed Table	Detects whether the by-pass feed table is open or closed.
SW2	36	Upper Tray (Non-duplex machines only)	Detects whether the upper paper tray is in place or not.
SW3	35	Lower Tray	Detects whether the lower paper tray is in place or not.
SW4	104	Tray Down (LCT machines only)	Sends a signal to the CPU to lower the LCT bottom plate.
SW5	25	Upper Tray Paper Size (Non-duplex machines only)	Determines what size of paper is in the upper paper tray.
SW6	34	Lower Tray Paper Size	Determines what size of paper is in the lower paper tray.
SW7	32	Vertical Guide Set (Non-LCT machines only)	Detects whether the vertical guide is open or not.
SW8	105	LCT Cover-1 (LCT machines only)	Detects whether the LCT cover is open or not.
SW9	103	LCT Cover-2 (LCT machines only)	Cuts the dc power line of the LCT lift motor.
SW10	42	Main	Supplies power to the copier.
SW11	41	Front Cover Safety	Cuts the ac power line and detects whether the front door is open or not.
SW12	48	Exit Cover Safety (A157/A159/A160 machines only)	Cuts the ac power line and detects whether the exit cover is open or not.
Magnetic Clutches			
CL1	72	Toner Supply	Turns the toner supply roller to supply toner to the development unit.
CL2	71	Development	Drives the development roller.
CL3	93	Transfer Belt Contact	Controls the touch and release movement of both the transfer belt unit and the drum charge roller unit.
CL4	73	Registration	Drives the registration rollers.
CL5	74	By-pass Feed	Starts paper feed from the by-pass feed table or LCT.
CL6	76	Relay	Drives the relay rollers.
CL7	84	Upper Paper Feed (Non-duplex machines only)	Starts paper feed from the upper paper tray.
CL8	85	Lower Paper Feed	Starts paper feed from the lower paper tray.

Symbol	Index No.	Description	Note
Solenoids			
SOL1	75	LCT machines: LCT/By-Pass Pick-up Solenoid Non-LCT machines: By-pass Pick-up Solenoid	Picks paper up from the by-pass feed table. When paper is fed from the LCT, this solenoid assists SOL3.
SOL2	91	Junction Gate (Duplex machines only)	Moves the junction gate to direct copies to the duplex tray or to the paper exit.
SOL3	98	LCT Pick-up (LCT machines only)	Picks up paper from the LCT.
SOL4	80	Upper Tray Pick-up (A153/A155 machines only)	Controls the up/down movement of the pick-up roller in the upper paper tray.
SOL5	82	Lower Tray Pick-up (A153/A155/A156 machines only)	Controls the up/down movement of the pick-up roller in the lower paper tray.
SOL6	81	Upper Tray Separation (A153/A155 machines only)	Controls the up-down movement of the separation roller in the upper paper tray feed station.
SOL7	83	Lower Tray Separation (A153/A155/A156 machines only)	Controls the up-down movement of the separation roller in the lower paper tray feed station.
Lamps			
L1	17	Exposure	Applies high intensity light to the original for exposure.
L2	65	Main Fusing	Provides heat to the central area of the hot roller.
L3	66	Secondary Fusing	Provides heat to both ends of the hot roller.
L4	4	Pre-transfer	Reduces the charge remaining on the drum surface before transfer.
L5	5	Quenching	Neutralizes any charge remaining on the drum surface after cleaning.
L6	2	Erase	After exposure, this eliminates the charge on areas of the drum that will not be used for the image.
Heaters			
H1	38	Drum	Turns on when the main switch is off to keep the temperature around the drum charge roller at a certain level. Also prevents moisture from forming around the drum.
H2	46	Optics Anti-condensation (option)	Turns on when the main switch is off to prevent moisture from forming on the optics.

Symbol	Index No.	Description	Note
H3	37	Lower Tray (option)	Turns on when the main switch is off to keep paper dry in the lower paper tray.
Thermistors			
TH1	69	Main Fusing	Monitors the temperature at the central area of the hot roller.
TH2	70	Secondary Fusing	Monitors the temperature at the ends of the hot roller.
TH3	47	Optics	Monitors the temperature of the optics cavity.
TH4	49	Drum Charge	Monitors the temperature of the drum charge roller.
Thermofuses			
TF1	68	Main Fusing	Provides back-up overheat protection in the fusing unit.
TF2	67	Secondary Fusing	Provides back-up overheat protection in the fusing unit.
TF3	18	Exposure Lamp	Opens the exposure lamp circuit if the 1st scanner overheats.
Counters			
CO1	40	Total	Keeps track of the total number of copies made.
CO2	N/A	Key (option)	Used for control of authorized use. The copier will not operate until it is installed.
Others			
CB1	9	Circuit Breaker (220 ~ 240V machines only)	Provides back-up high current protection for electrical components.
CC1	10	Choke Coil	Removes high frequency current.
TR1	7	Transformer (220 ~ 240V machines only)	Steps down the wall voltage to 100 Vac.

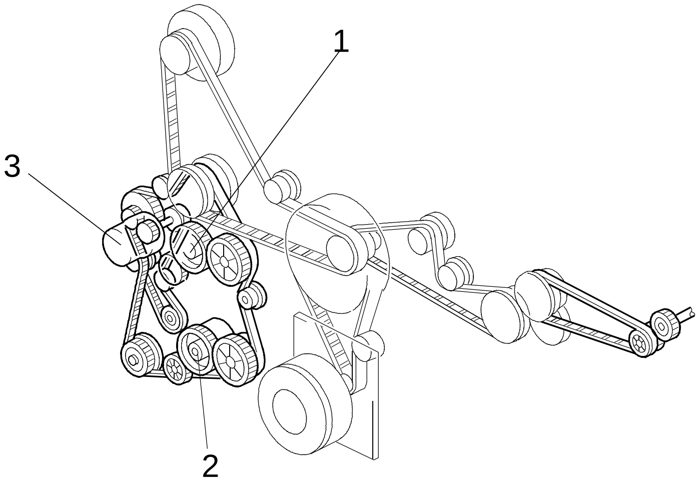
6. DRIVE LAYOUT

6.1 ALL MODELS



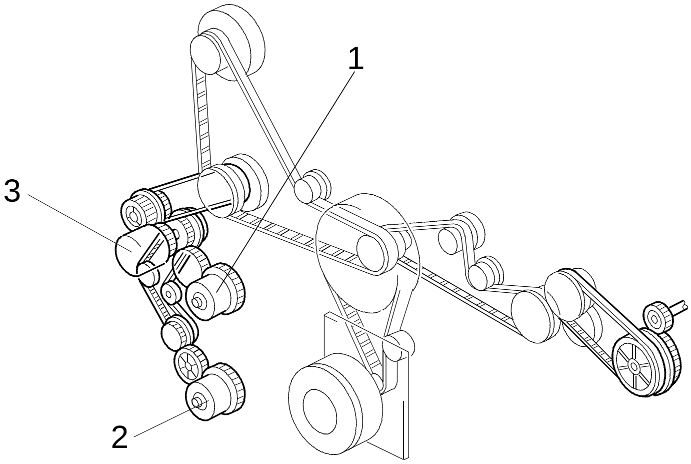
1. Drum Drive Pulley
2. Drum Charge Roller Drive Gear
3. Transfer Belt Contact Clutch Gear
4. Scanner Drive Motor
5. Scanner Drive Pulley
6. Transfer Belt Drive Gear
7. Fusing Unit Drive Gear
8. Main Motor
9. Main Pulley
10. Registration Clutch Gear
11. By-pass Feed Clutch Gear
12. Development Drive Clutch Gear
13. Toner Supply Clutch Gear

6.2 A153/A155/A156



1. Upper Paper Feed Clutch Gear (A153/A155 only)
2. Lower Paper Feed Clutch Gear
3. Relay Clutch Gear

6.3 A157/A159/A160



1. Upper Paper Feed Clutch Gear (A157/A159 only)
2. Lower Paper Feed Clutch Gear
3. Relay Clutch Gear

SECTION 2

DETAILED DESCRIPTIONS

1. PROCESS CONTROL

1.1 OVERVIEW

1.1.1 Copy Process around the Drum

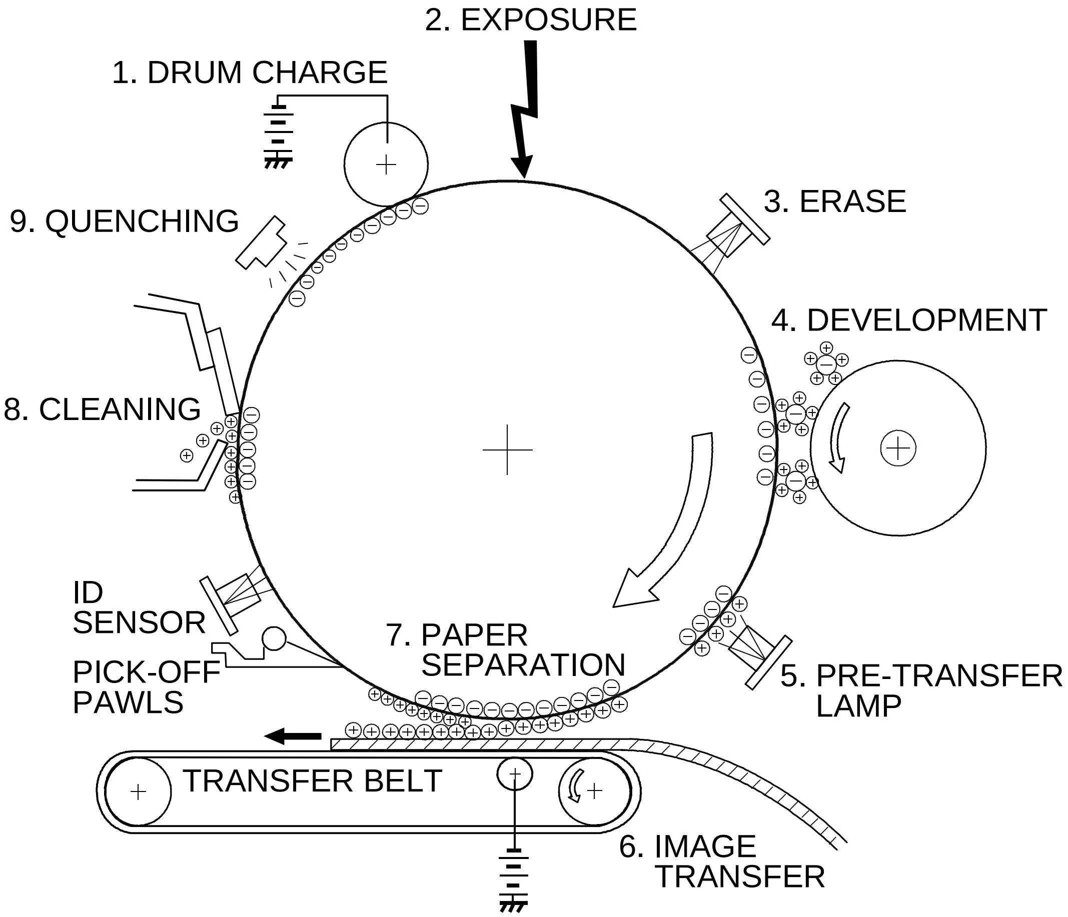

2. EXPOSURE
1. DRUM CHARGE
3. ERASE
9. QUENCHING
4. DEVELOPMENT
8. CLEANING
ID SENSOR
PICK-OFF PAWLS
7. PAPER SEPARATION
5. PRE-TRANSFER LAMP
TRANSFER BELT
6. IMAGE TRANSFER

Fig. 1 Copy Process Around the Drum

1. DRUM CHARGE

In the dark, the drum charge roller gives a uniform negative charge to the organic photo-conductive (OPC) drum. The charge remains on the surface of the drum because the OPC layer has a high electrical resistance in the dark. The amount of negative charge on the drum is proportional to the negative voltage applied to the drum charge roller.

2. EXPOSURE

An image of the original is reflected onto the OPC drum surface via the optics assembly. The charge on the drum surface is dissipated in direct proportion to the intensity of the reflected light, thus producing an electrical latent image on the drum surface.

The amount of remaining charge as a latent image on the drum depends on the exposure lamp intensity, which is controlled by the exposure lamp voltage.

3. ERASE

The erase lamp illuminates the areas of the charged drum surface that will not be used for the copy image. The resistance of the drum in the illuminated areas drops and the charge on those areas dissipates.

4. DEVELOPMENT

As a result of the development potential (the difference of charged voltage between the drum and the toner), toner is attracted to the areas of the drum where the negative charge is greater than that of the toner, and the latent image is developed.

The development bias voltage applied to the development roller shaft controls two things:

1) The threshold level for whether toner is attracted to the drum or whether it remains on the development roller.
2) The amount of toner to be attracted to the drum.

The higher the negative development bias voltage is, the less toner is attracted to the drum surface.

5. PRE-TRANSFER LAMP (PTL)

The PTL illuminates the drum to remove almost all the negative charge from the exposed areas of the drum. This prevents the toner particles from being reattracted to the drum surface during paper separation and makes paper separation easier.

6. IMAGE TRANSFER

Paper is fed to the area between the drum surface and the transfer belt at the proper time so as to align the copy paper and the developed image on the drum surface. Then, the transfer bias roller applies a strong negative charge to the reverse side of the copy paper through the transfer belt. This negative charge produces an electrical force which pulls the toner particles from the drum surface on to the copy paper. At the same time, the copy paper is electrically attracted to the transfer belt.

7. PAPER SEPARATION

Paper separates from the OPC drum as a result of the electrical attraction between the paper and the transfer belt. The pick-off pawls help separate the paper from the drum.

8. CLEANING

The cleaning blade removes toner remaining on the drum after the image is transferred to the paper.

9. QUENCHING

Light from the quenching lamp electrically neutralizes the charge on the drum surface.

1.1.2 Factors Affecting Process Control

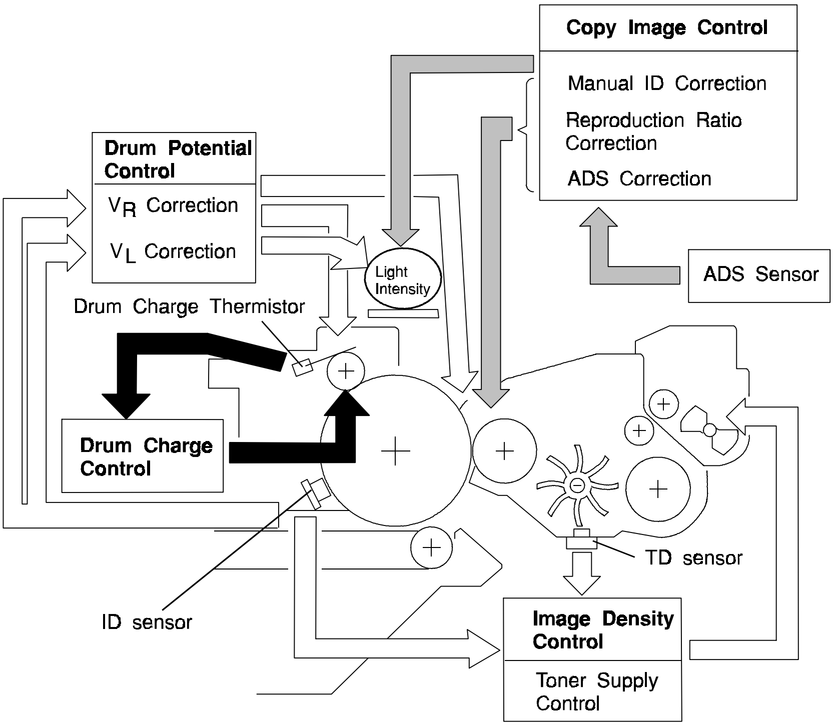

Copy Image Control
Manual ID Correction
Reproduction Ratio Correction
ADS Correction
Drum Potential Control
V_R Correction
V_L Correction
Light Intensity
ADS Sensor
Drum Charge Thermistor
Drum Charge Control
TD sensor
ID sensor
Image Density Control
Toner Supply Control

Fig. 2 Process Control

In this copier, the following items are controlled during the copy process to maintain good copy quality:

- Exposure lamp voltage
- Drum charge roller voltage
- Development bias voltage
- Toner supply

The machine controls the above by monitoring the following electrical components:

- Operation panel (manual ID selection and reproduction ratio)
- ADS sensor
- TD sensor
- ID sensor
- Drum charge thermistor
- Paper size detectors
- RAM board (drum rotation time, SP mode data, and paper size data)

1.1.3 Process Control Procedures

This section outlines how the machine controls the copy process based on the inputs from various sensors.

Copy Image Control

This is how the machine adjusts copy processes based on settings input at the operation panel.

- Manual ID Correction -

If the user inputs the image density manually, the machine adjusts the exposure lamp voltage and the development bias to achieve the selected image density.

- Reproduction Ratio Correction -

If the user selects a 116% or greater enlargement ratio or a 50% reduction ratio, the machine corrects the development bias to compensate for the loss in light intensity reaching the drum.

- ADS Pattern Detection and ADS Correction -

If the user selects Auto Image Density (ADS) mode, the machine monitors the output from the ADS sensor and adjusts the development bias to compensate for variations in ADS sensor response. This prevents dirty background.

Every 1,000 copies, the machine calibrates the ADS sensor output by reading the ADS pattern under the left scale of the exposure glass.

The ADS sensor must also be recalibrated:
- If the drum is changed
- If the ID sensor is cleaned or changed
- If the exposure lamp or optics are cleaned or changed.

Image Density Control

This is how the machine corrects the concentration of toner in the developer based on readings from the ID (Image Density) and TD (Toner Density) sensors.

- VSP and VSG Detection/ID Correction -

The machine uses VSP and VSG readings by the ID sensor, along with readings from the toner density sensor, to determine if the toner concentration in the developer is at the optimum level.

The amount of toner supplied to the V_{SP} pattern must remain constant. To ensure this, the machine applies a correction to the development bias for V_{SP} patterns when combined readings from the TD and ID sensors indicate that the carrier is ageing. This correction is called "ID Correction".

- Toner Supply -

There are three toner supply modes.

Detect toner supply: Toner supply varies with paper size, the latest TD sensor reading, and the latest V_{SP} and V_{SG} readings by the ID sensor. For example, toner supply will be increased if the toner weight ratio in the developer is decreasing, or if the most recent V_{SP} pattern was detected as being relatively light.

Fixed supply mode: The toner supply remains constant, but can be adjusted with an SP mode.

TD supply mode: Toner supply varies with TD sensor output. For example, if the toner weight ratio has decreased since TD sensor supply mode was selected, toner supply is increased.

Drum Potential Control

This is how the machine compensates for aging of the drum and the exposure lamp, and for the temperature around the drum charge roller.

- V_R Pattern Detection and V_R Correction -

As the drum gets older, the drum’s residual voltage gradually increases due to electrical fatigue. Light from the exposure lamp will not erase the increased residual voltage effectively and dirty background will result.

Every 1,000 copies, part of the drum is developed with the V_R pattern development bias. If there is residual voltage on the drum, this area of the drum will attract some toner, making a V_R pattern. The ID sensor response to this pattern is compared with the response of the ID sensor to a bare area of the drum. The higher the residual voltage on the drum is, the darker the V_R pattern is. If the pattern is too dark, the drum will not be discharged sufficiently. As a result, the machine will increase the negative development bias to prevent dirty background. If it does, image density will drop. To prevent this, the machine will also increase the negative drum charge roller voltage.

(The V_{RP}/V_{RG} range to which the above mentioned bias and charge corrections are applied may be shifted to cancel the effect of ID correction.)

V_R correction data must be reset by SP mode if the drum is changed or if the ID sensor is cleaned or replaced.

- V_L Pattern Detection and V_L Correction -

This is how the machine adjusts the exposure lamp voltage to compensate for the effects of drum wear, dirty optics, and response of the drum to light.

Every 1,000 copies, an image of the V_L pattern under the left scale bracket is made on the drum. The machine compares the response of the ID sensor to this image with the response to a bare area of the drum.

The exposure lamp voltage is adjusted if there have been significant changes from the measurements made from when a new drum or lamp was installed.

(The V_{LP}/V_{LG} range to which the above mentioned lamp voltage adjustment is applied may be shifted to cancel the effect of ID correction.)

Initial V_{LP}/V_{LG} detection must be done by SP mode if a new drum is installed or if the exposure lamp is cleaned or replaced.

- T/H Correction -

The efficiency of transfer of charge from the drum charge roller to the drum varies with the temperature near the drum charge roller. Also, the drum potential after charging varies with the accumulated rotation time of the drum.

A thermistor measures the temperature near the drum charge roller, and the CPU keeps track of how long the drum has rotated for.

The machine adjusts the drum charge roller voltage depending on the temperature and accumulated rotation time.

This section has provided an overview of all the process control procedures done by the machine. The next few pages will explain each of these in more detail. At the end, there will be a summary.

1.2 COPY IMAGE CONTROL

Copy image control adjusts the development bias and exposure lamp voltage to take account of the reproduction ratio and image density. The image density is either selected by the user or detected automatically.

1.2.1 Manual ID Correction

If the user selects the image density manually, the selected manual ID level affects the exposure lamp voltage and the development bias as follows.

- Exposure Lamp Voltage -

As the ID level increases from 1 to 7, the exposure lamp voltage is increased as shown in the following table.

Table 1. Exposure lamp voltage control by manual ID level

ID Level	Lamp Voltage
1	Vexp –4.0 V
2	Vexp –3.0 V
3	Vexp –1.5 V
4	Vexp ±0.0 V
5	Vexp +1.5 V
6	Vexp +4.0 V
7	Vexp +6.0 V

Vexp = Lamp voltage selected with SP4-001. It can be between 50 and 75 V. It is factory set, and varies from copier to copier.

- Development Bias -

The greater the negative voltage, the paler the image on the drum. However, the development bias is adjusted only at the extreme light and dark ends of the manual ID range.

Table 2. Development bias control by manual ID level

ID Level	Development Bias
1	+80 V
2	±0 V
3	±0 V
4	±0 V
5	±0 V
6	±0 V
7	SP2-201-002 (see below)

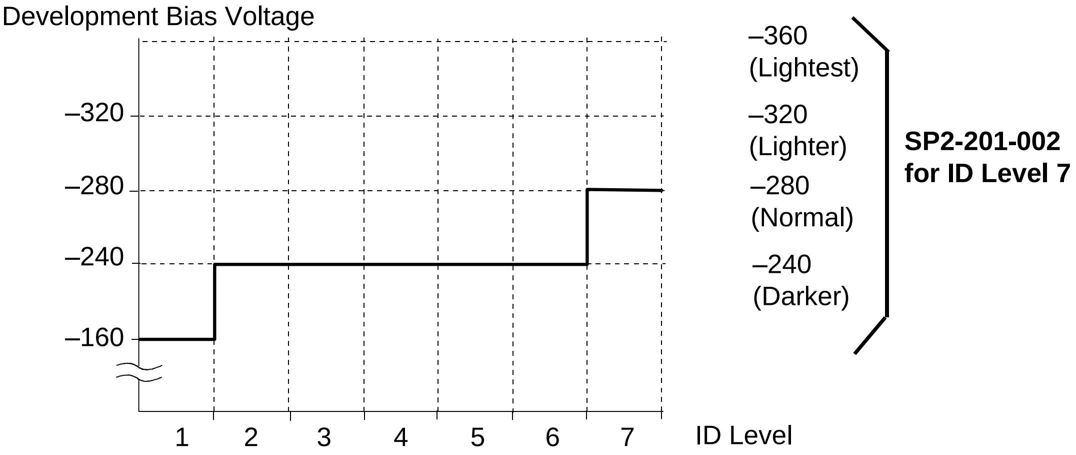
Note: The base development bias voltage is -240 Volts.

For ID Level 7 (lightest copies), there are four possible development bias correction settings that can be selected with SP2-201-002, as shown below.

Table 3. Lightest ID level development bias (ID Level 7)

SP2-201-002 Setting	Density	Dev. Bias Correction Voltage
1 (Factory Setting)	Normal	–40 V
2	Dark	±0 V
3	Lighter	–80 V
4	Lightest	–120 V

In summary, the development bias at various ID level settings is shown below.



1.2.2 Reproduction Ratio Correction

At reproduction ratios of 50% and 116% or greater, the intensity of light reaching the drum from the original drops significantly, which could cause copies to become underexposed (too dark).

To compensate for this, a development bias correction voltage is applied as shown in Table 4. This correction increases the development bias voltage, restoring the copy image density to normal.

Table 4. Reproduction ratio correction

Reproduction Ratio (%)	Development Bias Correction Voltage
181 ~ 200	–100 V
161 ~ 180	–80 V
142 ~ 160	–60 V
123 ~ 141	–40 V
116 ~ 122	–20 V
51 ~ 115	±0 V
50	–30 V

1.2.3 ADS Correction

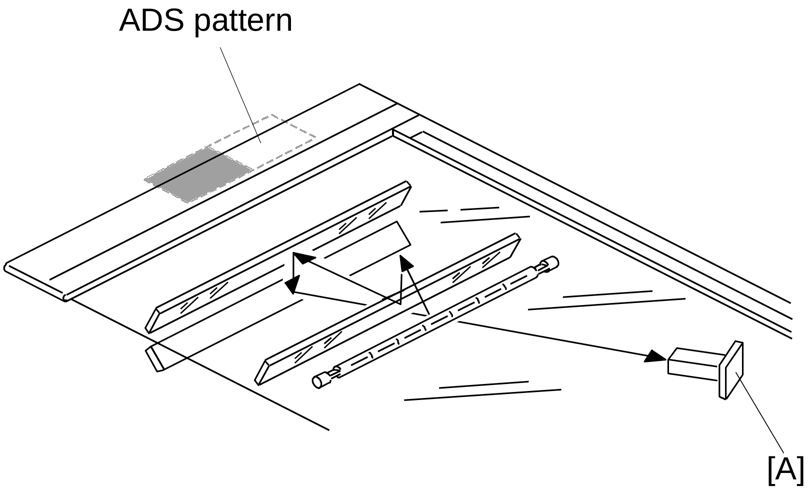


Fig. 3 ADS pattern

If the user selects Auto Image Density (ADS) mode, the output of the ADS sensor is used to correct the development bias; the exposure lamp voltage is kept at the setting for ID level 4 and is not adjusted.

In ADS mode, the ADS sensor [A] detects the original background density. To prevent dirty background from appearing on copies, the CPU corrects the development bias voltage for the original. To do this, it compares the ADS sensor output from the original [VADS (original)] with a stored reference value [VADS (pattern)] that was taken earlier from the ADS sensor pattern. The correction is shown in table 5, and is applied every copy.

Table 5. ADS data correction

ADS Density SP5-106		**Development Bias Correction Voltage**
Setting	**Copy Density**	
0	Darker	816 x (AR – 0.79)
1	Normal	816 x (AR – 0.85)
2	Lighter	816 x (AR – 0.95)

Where AR (ADS Ratio) = VADS (original)/VADS (pattern)

Note that there are three possible corrections. The default setting is 1 (normal). However, for example, if the user requires copies to be darker when using ADS mode, a technician can set SP5-106 to 0.

VADS (pattern) is checked every 1,000 copies. (See process control checks at every 1,000 copies on p2-29.) It is kept at 2.7±0.1 volts by a gain adjustment.

See the "Optics - Automatic Image Density Control System (ADS)" section for more details on how the ADS sensor measures the background and on how [VADS (pattern)] is corrected every 1,000 copies.

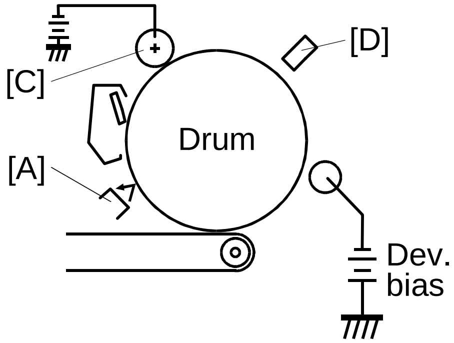
1.3 IMAGE DENSITY CONTROL

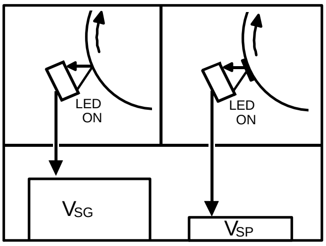
1.3.1 Overview

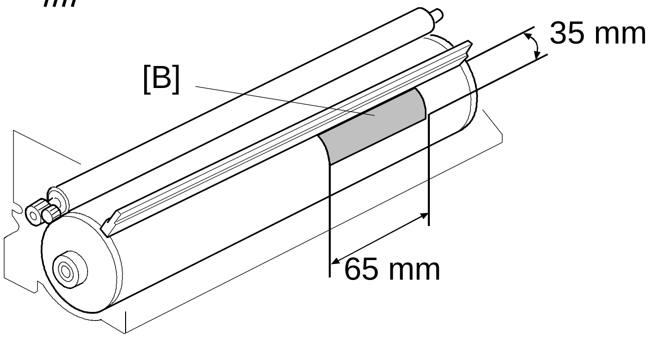
The machine controls the toner supply mechanism using the toner density sensor (TD sensor) and the image density sensor (ID sensor).

Readings from the TD sensor are used to keep the toner concentration in the developer at a constant level. However, the image on the OPC drum varies due to the variation in toner chargeability, which is influenced by the environment, even if the toner concentration is constant. Because of this, readings from the ID sensor are used to change the toner concentration to keep the image density on the OPC drum constant.

1.3.2 VSP and VSG Detection





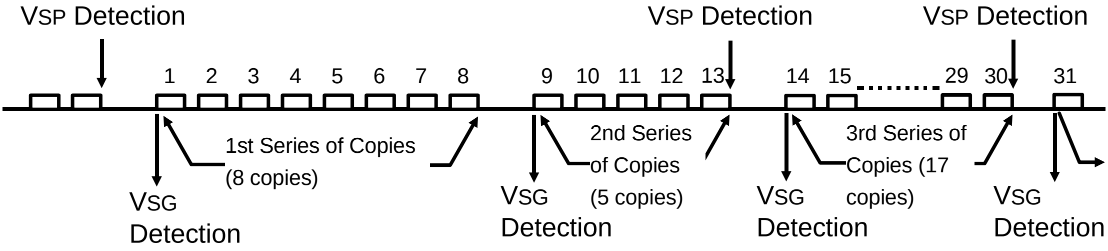


The ID sensor [A] (below the drum cleaning section) checks the following voltages.

- VSG: the ID sensor output when checking the erased drum surface.
- VSP: the ID sensor output when checking the Vsp pattern image.

In this way, the reflectivity of both the erased drum surface and the pattern on the drum are checked. This compensates for any variations in light intensity from the LED component of the sensor or the reflectivity of the drum.

The VSP pattern [B] is made on the OPC drum by the drum charge roller [C] and the erase lamp [D].


VSP Detection
VSP Detection
VSP Detection
1 2 3 4 5 6 7 8
9 10 11 12 13
14 15
29 30
31
1st Series of Copies (8 copies)
2nd Series of Copies (5 copies)
3rd Series of Copies (17 copies)
VSG Detection
VSG Detection
VSG Detection
VSG Detection

- VSG is measured at the start of every copy run.
- VSP is detected at the end of a copy run if 10 or more copies have been made since VSP was last measured. The transfer belt must be released to measure VSP, so it cannot be checked during a copy run.

1.3.3 ID Correction for the VSP Pattern

Background

Developer consists of carrier particles (ferrite and resin) and toner particles (resin and carbon). The positive triboelectric charge on the toner is caused by friction between the carrier and toner particles. However, the chargeability of carrier decreases with time. Therefore, if the toner weight ratio in the developer is the same, the amount of positive triboelectric charge for one particle of toner decreases. This is because the number of toner particles which surround one carrier particle is the same, but the chargeability of one particle of carrier is less than before.

If the development potential, that is, the difference of voltage between the development roller and the drum for the VSP pattern is the same, more toner particles are attracted to the VSP pattern, because one particle of toner has less positive charge than before. (More toner particles are required to balance the charge of the VSP pattern.)

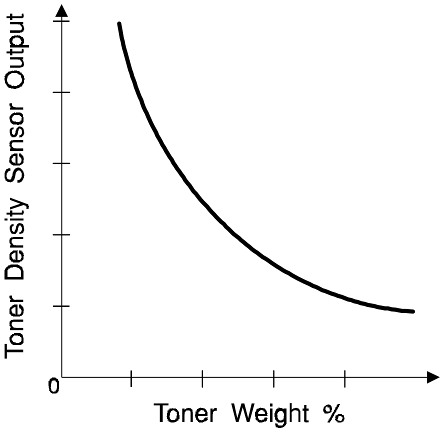
If the ID sensor were to check the VSP pattern’s reflectivity under this condition, the VSP pattern would be darker than before. The CPU would then incorrectly conclude that the toner weight ratio in the developer is too high even though the ratio actually remains the same. The CPU would then decrease the toner clutch on time, leading to a low percentage of toner in the developer by weight as the copy count rises.

If uncontrolled, this would cause some side effects, such as low image density or developer adhering to the copy. To prevent these side effects, ID correction is done when the VSP pattern is made.

The idea behind ID correction is to cancel the effect on the VSP pattern of the decrease in the chargability of carrier with time. ID correction is done by changing the development bias for the VSP pattern so that it has the same darkness even though the chargeability of the carrier has changed.

ID Correction Method

The machine determines whether the development bias needs adjusting by monitoring the density of the toner/carrier mixture in the development unit. When the toner weight ratio in the developer changes, the voltage output by the TD sensor changes accordingly. The smaller the toner wight ratio in the developer is, the greater the TD sensor output is, as shown in the diagram below.



When new developer with the standard concentration (2.0% by weight, 20 g of toner in 1,000 g of developer) is installed, the TD sensor initial setting must be done with SP mode 2-214. This sets the sensor output to 2.5 ± 0.1 V.

As shown earlier, the chargeability of carrier in the developer decreases with the copy count. If no correction is done, the CPU tries to decrease the toner weight ratio in the developer. So this eventually causes the reading from the TD sensor to exceed its maximum acceptable value (initial value + 1.0 V).

If the corrected TD sensor output VTREF exceeds the upper limit over 100 times continuously, development bias for the VSP pattern is corrected. VTREF is the current TD sensor output with a correction factor included that is based on the VSP/VSG ratio from the ID sensor (see VSP and VSG Detection) calculated every 10 copies or so (see Toner Supply Control - Detect Supply Mode for more about VTREF).

The first time this happens, the correction is -40 V. If the upper limit is exceeded 100 consecutive times again later, an extra -40 V correction is applied (see the following table). There should be no need for further steps, because the toner proportion by weight will stabilize before this.

Table 6. ID correction

Step	Development Bias Correction for the V_{SP} Pattern
Initial	0 V
1st	–40 V
2nd	–80 V

If no correction is applied, the charge on the drum for the V_{SP} pattern is –600 V, and the development bias for the V_{SP} pattern is –300 V. So there is a difference of 300 V between the development roller and the drum for the V_{SP} pattern.

When the ID correction is applied, the voltage difference is reduced. For example, if a –40 V ID correction is applied, the difference in voltage is:
Before ID Correction: –300 – (–600) = 300 V
After ID Correction: –300 **– 40** – (–600) = 260 V

As a result, the effect of the change in chargeability of the carrier particles is canceled. The darkness of the V_{SP} pattern returns to normal.

1.3.4 Toner Supply Control During Copying

There are three modes for controlling the toner supply.

- Detect supply mode
- Fixed supply mode
- TD sensor supply mode

The mode can be selected with SP2-208-001. The factory setting is detect supply mode.

Toner clutch on time is calculated by the following formula.

$$\text{Toner CL on time [ms]} = \frac{\mathbf{S \times AT \times TSC/100}}{\mathbf{TS}} \qquad \text{(Formula 1)}$$

where: S = Copy paper size [cm^2]
AT = Amount of toner developed on the latent image per unit area
= 0.7 [mg/cm^2] (constant)
TSC = Toner supply coefficient [%]
TS = Amount of toner supplied per unit of time
= 0.183 [mg/ms] (for A153, A155, and A156 copiers)
= 0.133 [mg/ms] (for A157, A159, and A160 copiers)

AT and TS are constant, and S depends only on paper size, but TSC is determined in different ways depending on which toner supply mode is in use.

Determination of TSC

TSC is an estimate of the proportion of black area in the image that is made by the machine.

(1) Detect Supply Mode

In detect supply mode, TSC is determined from outputs from both the TD and ID sensors, in conjunction with the toner supply ratio that has been selected for this mode.

- Toner Supply Ratio -

This is selected with SP2-222. The settings are 1 (7%), 2 (15%), 3 (30%), or 4 (60%). The default is 15%.

- TD and ID Sensor Outputs -

The machine calculates a value for VT-VTREF.

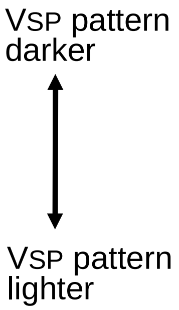
- VT: Current TD sensor output
- VTREF: TD sensor output at the latest VSP detection corrected for ID sensor output (VSP/VSG); this is calculated every 10 or so copies (see VSP/VSG Detection for more on VSP and VSG).

VTREF is determined as follows.

VTREF = VTP + Δ VREF **(Formula 2)**

- VTP = TD sensor output at VSP detection
- ΔVREF = Correction factor based on VSP/VSG (from the ID sensor output), determined by the following table.

Table 7.



VSP/VSG	Δ VREF [V]
~ 0.075	+4 x 0.0196
0.076 ~ 0.090	+2 x 0.0196
0.091 ~ 0.105	±0
0.106 ~ 0.125	–2 x 0.0196
0.126 ~ 0.160	–4 x 0.0196
0.161 ~ 0.205	–6 x 0.0196
0.206 ~ 0.500	–8 x 0.0196
0.501 ~	The previous VTREF

TSC [%] is then determined from VT-VTREF and the toner supply ratio, as shown by table 8.

Table 8. Toner Supply Coefficient (%)

(V_T-V_{TREF}) /0.0196	**Supply Ratio (SP Mode Setting)**			
	7%	**15%**	**30%**	**60%**
~ 0	0	0	0	0
1 ~ 3	7	15	30	60
4 ~ 5	15	30	45	60
6 ~ 7	30	45	60	60
8 ~	60	60	60	60

For example, if the toner supply ratio is 15% and (V_T-V_{TREF})/0.0196 is 4.5, TSC is 30. This value is then used in the formula to determine the toner supply clutch on time given at the start of this discussion. (See formula 1.)

This all means that, if the ID sensor reading indicated that the most recent V_{SP} pattern was relatively light, the toner supply clutch will stay on for longer. (If V_{SP}/V_{SG} is higher, ΔV_{REF} is smaller [Table 7]. This means that V_{TREF} is smaller [Formula 2], leading to a larger V_T-V_{TREF}. So, for a particular toner supply ratio, the TSC value will be higher [Table 8], so the clutch stays on for longer [Formula 1].)

(2) Fixed Supply Mode

TSC [%] is fixed. It is selected with SP mode 2-208-003 as shown below.

Table 9. Toner Supply Coefficient (%)

	SP2-208-003 Value			
	1	**2**	**3**	**4**
TSC [%]	2	4	6	11

NOTE: Default = 6%

The machine automatically switches to fixed supply mode if the ID or TD sensor fail (see section 1.3.5.).

(3) TD Sensor Supply Mode

TSC [%] is determined as shown in Table 8 for detect supply mode. However, the toner supply ratio and $V_T - V_{TREF}$ are both determined in different ways. In particular, the ID sensor output is ignored.

- Toner Supply Ratio -

The supply ratio is selected with SP2-208-002. The settings are 1 (7%), 2 (15%), 3 (30%), or 4 (60%). The default is 15%.

- $V_T - V_{TREF}$ -

- V_{TREF} = V_{TREF} at the moment that TD sensor supply mode was selected.
- V_T = Current TD sensor output

1.3.5 Toner Supply in Abnormal Sensor Conditions

If any sensor errors occur under detect supply mode, toner supply mode is changed automatically as shown below.

Table 10.

Error	Abnormal Condition	Fallback Toner Supply Mode	Display on Operation Panel
ID Sensor Adjustment Error	When ID sensor output cannot be adjusted to 4.0 ± 0.2 V	Fixed Supply Mode	None
Abnormal ID Sensor (V_{SP})	If V_{SP} > 2.5 V during V_{SP} detection.	Fixed Supply Mode	None
Abnormal ID Sensor (V_{SG})	If V_{SG} < 2.5 V during V_{SG} detection	Fixed Supply Mode	
TD Sensor Adjustment Error	When TD sensor output cannot be adjusted to 2.5 ± 0.1 V	Fixed Supply Mode	Manual ID level or ADS indicator blinks
TD Sensor (V_T) Measurement Error	If V_T > 4.0 V or V_T < 0.3 V during V_T detection.	Fixed Supply Mode	Manual ID level or ADS indicator blinks
Drum Charge Thermistor Error	Temperature detected by the drum charge thermistor is below 0°C or above 60°C	Fixed Supply Mode	None
Abnormal Drum Charge Thermistor Output	Temperature detected by the drum charge thermistor (T) is between 0 °C and 20°C	TD Sensor Supply Mode	None

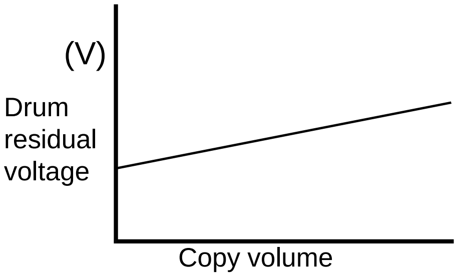
NOTE: No indication is displayed under the "abnormal drum charge thermistor output" condition, because the machine soon recovers due to the heat inside the machine.

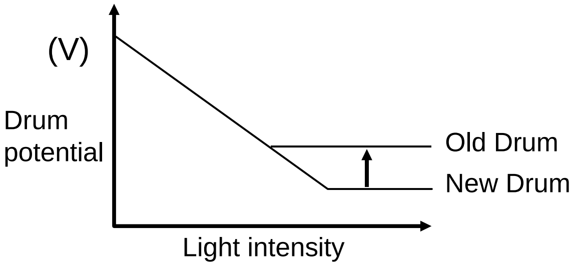
1.4 DRUM POTENTIAL CONTROL

The characteristics of the drum vary with the temperature around the drum, and they change as the drum gets older. To take account of these and other related factors, this machine has the following three drum potential control routines.

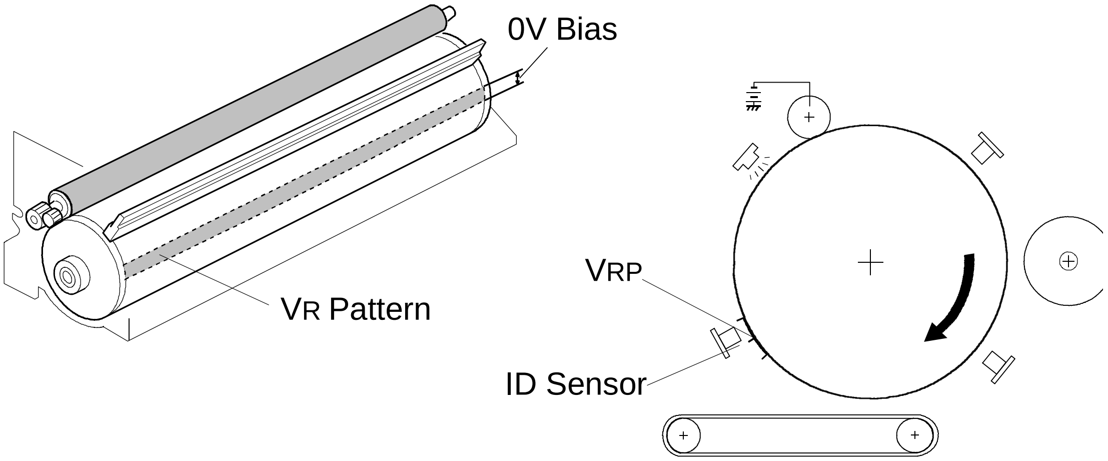
- VR pattern correction
- VL pattern correction
- T/H correction

1.4.1 VR Pattern Correction





As the drum ages, the drum residual voltage gradually increases due to electrical fatigue (see the upper left chart). In other words, as the drum gets older, light does not discharge it as much (see the upper right chart). This may cause dirty background on copies. VR pattern detection every 1,000 copies using the ID sensor avoids this problem.



Every time VR pattern detection is done, a strip across the drum is charged using zero development bias and the standard charge on the drum charge roller that is used for copying (with all corrections included). At the same time, all the blocks of the erase lamp turn on to illuminate this charged area of the drum.

If there is residual voltage on the drum, this area of the drum will attract some toner, making a VR pattern. The ID sensor checks the reflectivity of the VR pattern. This sensor output voltage is VRP.

In VR detection, VRP is compared with VRG.

- VRG is the reflectivity of the bare area of the drum, measured by the ID sensor. It has the same value as VSG (see Image Density Control - VSG and VSP Detection).
- VRP is the output from the ID sensor reflected from the VR pattern.

When the drum residual voltage increases, the VR pattern becomes darker. Then, VRP decreases and the VRP/VRG ratio decreases.

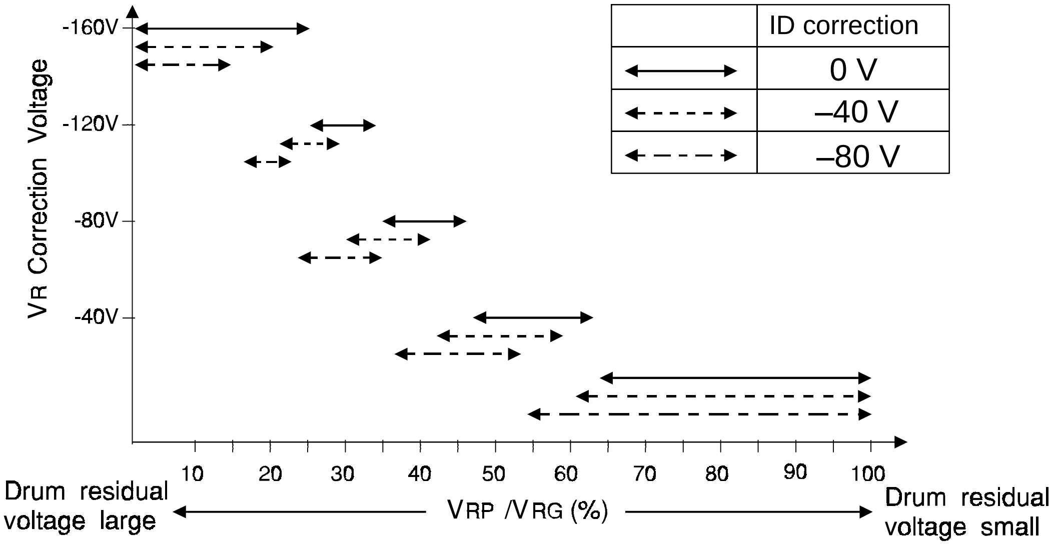
Then the CPU increases the negative development bias voltage to prevent dirty background, and simultaneously increases the negative drum charge roller bias voltage to prevent low image density. This is the VR correction.

Table 11. VR correction

	ID Correction			**Drum Charge Roller Correction Voltage**	**Development Bias Correction Voltage**
	±0 V	**–40 V**	**–80 V**		
VRP/VRG x 100(%)	64 ~ 100	60 ~ 100	54 ~ 100	±0 V	±0 V
	47 ~ 63	42 ~ 59	36 ~ 53	–40 V	–40 V
	35 ~ 46	30 ~ 41	24 ~ 35	–80 V	–80 V
	26 ~ 34	21 ~ 29	16 ~ 23	–120 V	–120 V
	0 ~ 25	0 ~ 20	0 ~ 15	–160 V	–160 V

For example, taking the ID correction to be zero for now, if VRP/VRG is 45%, the drum charge and development bias corrections will both be -80V.

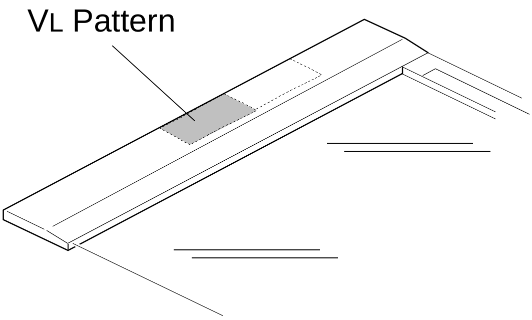
VR correction also depends on the current VSP pattern ID correction that is being used. If development bias has been increased by ID correction, the VR correction may be smaller in some cases to take this into account. This is shown by both the table above and the following figure.

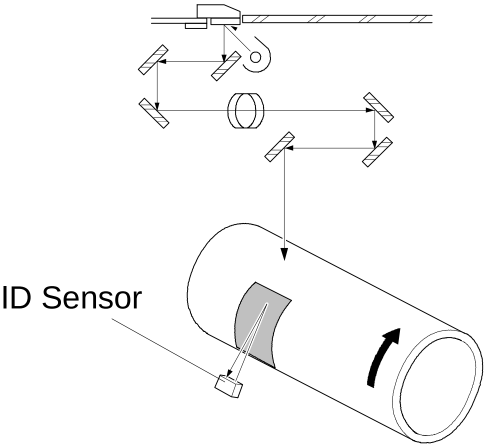


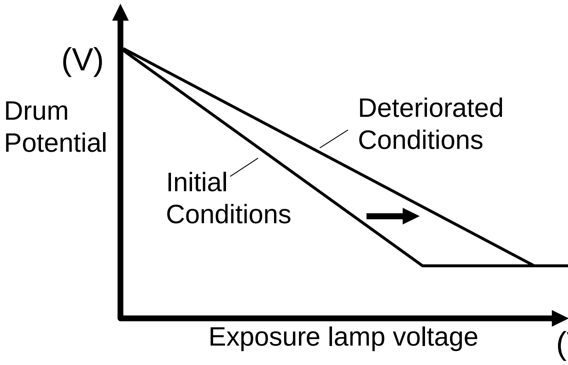
Using the same example to illustrate this, but with an ID correction of -40V, the corrections will both be -40 V this time.

Note that forced V_R detection by SP mode must be done when a new drum is installed or the ID sensor cleaned or replaced. (See Service Tables - Practical SP Mode Use Tables for the correct sequence of SP modes to perform at this time). The correction is done in the same way as described above.

1.4.2 VL Pattern Correction







Dirty optics or deterioration of the exposure lamp decreases the intensity of the light that reaches the drum via the optics cavity. As more copies are made during the drum’s life, the photoconductive layer gets worn and the response of the drum to the exposure lamp weakens.

VL pattern correction counteracts dirty background caused by the factors mentioned above.

The VL pattern is a light gray sensor pattern on the operator side of the bottom of the left scale bracket. The ID sensor output at VSG detection in memory is used again as VLG (the reflectivity of the bare area of the drum).

When VL pattern detection starts, the exposure lamp turns on and the main motor stays on to rotate the drum. The drum charge roller, all the blocks of the erase lamp, the pre-transfer lamp, and the quenching lamp turn on. Then, the appropriate blocks of the erase lamp turn off and on to make a VL pattern on the drum surface.

In VL detection, VLP is compared with VLG.

- VLG is the reflectivity of the bare area of the drum, measured by the ID sensor. It has the same value as VSG (see Image Density Control - VSG and VSP Detection).
- VLP is the output from the ID sensor reflected from the VL pattern.

V_L detection is done at the following times:

- Every 1000 Copies
- Forced Detection: whenever a new drum or exposure lamp is installed, or exposure lamp voltage is adjusted, or when the optics are cleaned, forced V_L detection (SP3-105) must be executed. (See Service Tables - Practical SP Mode Use Tables for the correct sequence of SP modes to perform at this time).

  Forced V_L detection is different from the routine 1,000 copy V_L detection, so it is explained below in detail.
  During forced V_L detection, BL and V_{REF} are determined as shown below.
  NOTE: BL = Development bias used for V_L correction.

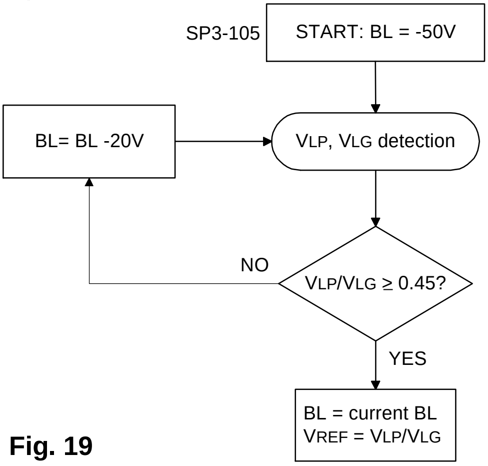


Fig. 19

BL starts at -50 V and -20 V is added until the value of V_{LP} is appropriate.

V_L Correction Method

During V_L pattern detection, lamp voltage, drum charge voltage and development bias are as follows.

- Lamp voltage: same as during normal copying (ADS mode)
- Drum charge voltage for the V_L pattern: same as during normal copying
- Development bias for forced V_L detection: BL + V_R correction + $V_{BL(ID)}$
- Development bias for V_L detection every 1000 copies:
  = BL + (–25 V) + V_R correction + $V_{BL(ID)}$

V_{BL} (ID) is an ID compensation factor based on the current ID correction used for the V_{SP} pattern (see Image Density Control for details on this ID Correction). It is applied as shown in Table 12.

Table 12

ID correction	0 V	–40 V	–80 V
V_{BL}(ID)	±0 V	–10 V	–20 V

- Forced VL Detection -

When forced VL detection (SP3-105) is executed, the CPU stores the VL reference value (VREF) in memory (see Fig. 19).

VREF = initial VLP/VLG

- Every 1,000 copies -

After the forced VL detection, VL detection is performed at the end of every 1000 copies. The VLP/VLG value at that time is called VDAT.

VDAT = current VLP/VLG

- During Copying -

The CPU compares the latest VDAT with the latest VREF and applies a VL correction to the exposure lamp voltage as shown below.

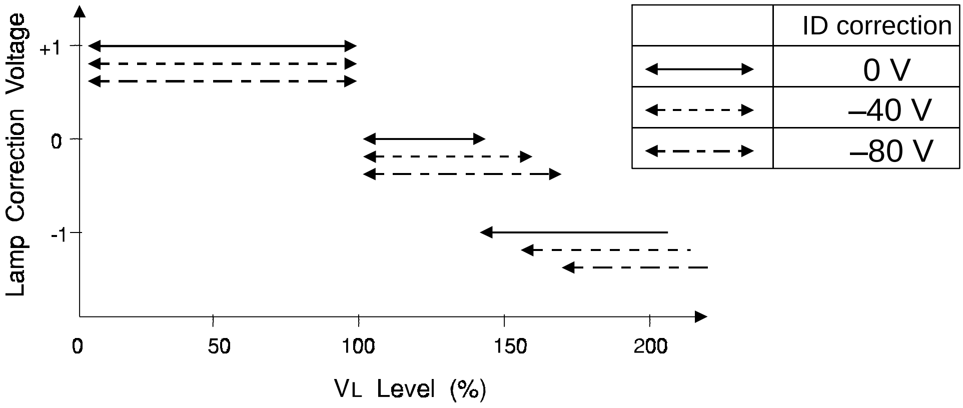
Table 13. VL Correction

	ID Correction			Lamp Correction Voltage
	±0 V	**–40 V**	**–80 V**	
VDAT/VREF x 100 (%)	146 ~	156 ~	168 ~	–1 V
	101 ~ 145	101 ~ 155	101 ~ 167	±0 V
	~ 100	~ 100	~ 100	+1 V

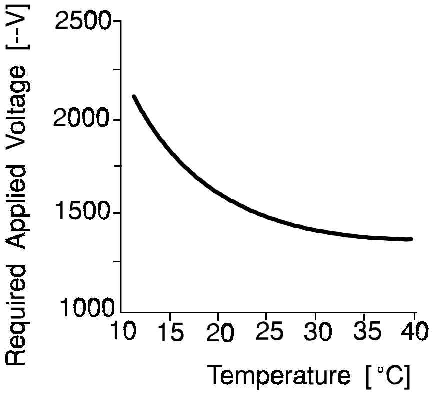
In general, the lamp will be dimmed slightly if the VLP pattern reflectivity has increased significantly (the VLP pattern is paler), and made brighter if the reflectivity has decreased (the VLP pattern is darker).

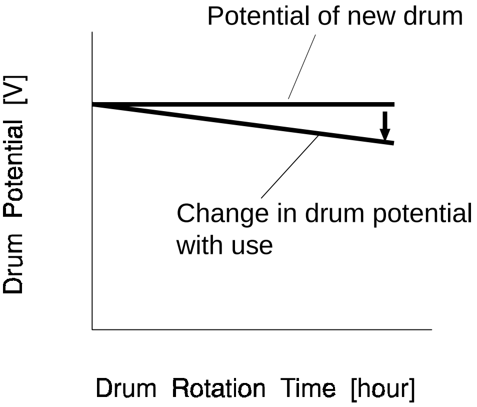
VL correction also depends on the current VSP pattern ID correction that is being used (see Image Density Control - ID Correction for the VSP pattern).

For example, taking the ID correction to be zero for now, if VDAT/VREF is 150%, the lamp correction will be -1V (made slightly dimmer). Using the same example, but with an ID correction of -40V, the correction will be 0 V this time.



1.4.3 T/H Correction





The drum charge efficiency is the ratio of the charge actually on the drum to the charge that was applied to the drum. It varies with the temperature around the drum charge roller. It drops off at lower temperatures, so the lower the temperature is, the higher the charge that is required.

Also, as the drum ages, the photoconductive layer gets worn. This causes a decrease in the drum potential after charging.

The drum charge thermistor detects the temperature (T) around the drum charge roller. The drum charge roller voltage is changed to account for the effects of temperature on drum charge efficiency.

The CPU also keeps track of the drum rotation time (H) that corresponds to the wear on the drum surface. The drum charge roller voltage is increased at set intervals.

These corrections for the drum charge roller voltage are called T/H correction.

The T/H correction that is applied during copying differs from that applied when making ID sensor patterns. See below for how the correction is determined.

The T/H correction difference between the A153, A155, and A156 copiers and the A157, A159, and A160 copiers is a result of the difference in copy processing speed (200 mm/s for the A153, A155, and A156 copiers, compared with 150 mm/s for the A157, A159, and A160 copiers).

Table 14. T/H Correction (Copying) - Base drum charge voltage = -1500 V

A153, A155, and A156 copiers

Drum Charge Roller Temperature (T)	**Drum Rotation Time (H)**		
	0 ≤ H < 40	**40 ≤ H < 110**	**110 ≤ H**
37.1 ≤ T	-60.0	-60.0	-60.0
29.6 ≤ T < 37.1	-203.4 + 3.9xT	-203.4 + 3.9xT	-203.4 + 3.9xT
17.9 ≤ T < 29.6	-729.1 + 21.6xT	-923.9 + 28.2xT	-1116.1 + 34.7xT
12.6 ≤ T < 17.9	-1345.1 + 56.0xT	-1705.8 + 71.9xT	-2068.9 + 87.9xT
T < 12.6	-639.0	-800.0	-961.0

A157, A159, and A160 copiers

Drum Charge Roller Temperature (T)	**Drum Rotation Time (H)**		
	0 ≤ H < 40	**40 ≤ H < 110**	**110 ≤ H**
32.4 ≤ T	-80.0	-80.0	-80.0
28.2 ≤ T < 32.4	-426.7 + 10.7xT	-426.7 + 10.7xT	-426.7 + 10.7xT
18.0 ≤ T < 28.2	-621.8 + 17.6xT	-768.4 + 22.8xT	-912.2 + 27.9xT
12.4 ≤ T < 18.0	-1028.6 + 40.2xT	-1357.2 + 55.5xT	-1689.7 + 71.1xT
T < 12.4	-530.0	-669.0	-808.0

Table 15. T/H Correction (V_{SP} Pattern) - Base drum charge = -1300 V

A153, A155, and A156 copiers

Drum Charge Roller Temperature (T)	**Drum Rotation Time (H)**		
	0 ≤ H < 40	**40 ≤ H < 110**	**110 ≤ H**
37.1 ≤ T	+40.0	+40.0	+40.0
29.6 ≤ T < 37.1	-103.4 + 3.9xT	-103.4 + 3.9xT	-103.4 + 3.9xT
17.9 ≤ T < 29.6	-489.9 + 16.9xT	-603.8 + 20.8xT	-717.6 + 24.6xT
12.6 ≤ T < 17.9	-862.5 + 37.7xT	-1164.2 + 52.1xT	-1465.9 + 66.4xT
T < 12.6	-387.0	-508.0	-629.0

A157, A159, and A160 copiers

Drum Charge Roller Temperature (T)	**Drum Rotation Time (H)**		
	0 ≤ H < 40	**40 ≤ H < 110**	**110 ≤ H**
32.4 ≤ T	+24.0	+24.0	+24.0
28.2 ≤ T < 32.4	-283.9 + 9.5xT	-283.9 + 9.5xT	-283.9 + 9.5xT
18.0 ≤ T < 28.2	-402.6 + 13.7xT	-532.4 + 18.3xT	-662.2 + 22.9xT
12.4 ≤ T < 18.0	-719.3 + 31.3xT	-919.5 + 39.8xT	-1117.6 + 48.2xT
T < 12.4	-331.0	-426.0	-520.0

For example, when copying with an A157 copier at 25°C with a drum that has a rotation time of 100 hours:

- The T/H correction is -768.4 + (22.8 x 25) V = -198.4 V.
- The drum charge roller voltage is the base voltage plus the T/H correction
  = (-1500) - 198.4
  = -1698.4 V.

1.5 PROCESS CONTROL DURING ABNORMAL CONDITIONS

When an abnormal sensor condition occurs, some process controls are disabled.

Abnormal Condition	Process Control			
	ID Sensor Adjustment	**V_R Correction**	**V_L Correction**	**ADS Sensor Adjustment**
Thermistor Error	Disabled			
TD Sensor Adjustment Error				
TD Sensor Detection Error				
V_{SP} Error				
V_L Error				
ID Sensor Adjustment Error	Executed	ID sensor adjustment error → Disabled If the ID sensor can be adjusted → Executed		
V_{SG} Error				

1.6 SUMMARY

1.6.1 Process Control and Sensor Detection Timing

A summary of process control and correction timing is shown below.

Correction	Electrical Component	Sensor Output Used	Correction Timing		Corrected Value
			Forced Correction	**Automatic Correction**	
Manual ID correction	Operation panel	—	—	Every copy in manual ID mode	• Lamp voltage • Dev. bias
Reproduction ratio correction	Operation panel	—	—	Every copy in reduce/enlarge mode	Development bias
ADS correction	ADS sensor	V_{ADS} (pattern) V_{ADS} (original)	—	• ADS Mode: Once per original (ARDF mode), or once when the Start key is pressed (Platen mode)	Development bias
			New drum, ADS sensor, or exposure lamp	Every 1000 copies	• V_{ADS} (pattern) is stored
ID correction and Toner density control	ID sensor	V_{SG}	New drum or ID sensor replacement	At the start of each copy job	• Dev. bias
		V_{SP}		About every 10 copies	• Toner supply clutch ON time
	TD sensor	V_{T}	When the developer is changed	Every copy	
V_{R} correction	ID sensor	V_{RP}, V_{RG}	New drum or ID sensor replacement	After every 1000 copies	• Drum charge roller voltage • Dev. bias
V_{L} correction	ID sensor	V_{LP}, V_{LG}	New drum or exp. lamp		Lamp voltage
T/H correction	• Drum charge roller thermistor • RAM Board	T: (temperature) H: (drum rotation time)	H is reset at the drum initial setting	Every copy	Drum charge roller voltage

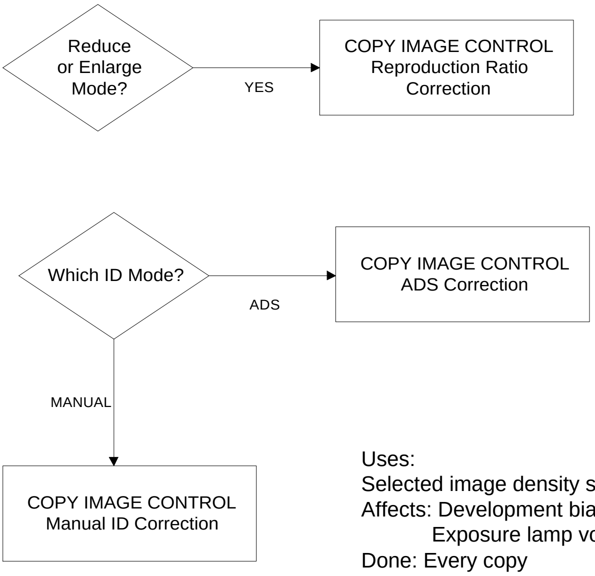
1.6.2 Process Control Checks During Machine Operation

This section shows what the machine checks and recalibrates to control the copy process at different times.

Every Copy

The machine automatically adjusts the following process control parameters every copy.

IMAGE DENSITY CONTROL VSG Correction	Done at the start of every copy run	Uses: ID Sensor Affects: Development bias Toner supply clutch on time
IMAGE DENSITY CONTROL VT Correction	Done every copy	Uses: TD sensor Affects: Development bias Toner supply clutch on time
DRUM POTENTIAL CONTROL T/H Correction	Done every copy	Uses: Drum charge thermistor Drum rotation time to date Affects: Drum charge roller voltage


Reduce or Enlarge Mode?
YES
COPY IMAGE CONTROL
Reproduction Ratio Correction
Which ID Mode?
ADS
COPY IMAGE CONTROL
ADS Correction
MANUAL
COPY IMAGE CONTROL
Manual ID Correction

Uses:
Selected reproduction ratio
Affects: Development bias
Done: Every copy

Uses: ADS sensor
Affects: Development bias
Done:
Single copy of an original -
Every copy
More than one copy of the same original -
Every copy (but only for the first copy run)

Uses:
Selected image density setting
Affects: Development bias
Exposure lamp voltage
Done: Every copy

IMAGE DENSITY CONTROL VSP Detection	Done at the end of the copy run if more than 10 copies have been made since the previous VSP detection.	Uses: ID Sensor Affects: Development bias Toner supply clutch on time

Every 1000 Copies

After every 1,000 copies, the machine calibrates the following reference values for the various processes that are used in process control.

NOTE: If the auto process control mode has been disabled with SP3-801, this process control cycle will not be performed.

IMAGE DENSITY CONTROL V_{SG} Reset	Resets V_{SG} to 4 ± 0.2 V.	Uses: ID sensor Affects: Development bias Toner supply clutch on time
DRUM POTENTIAL CONTROL V_R Correction	Measures V_{RP} Sets V_{RG} = V_{SG}	Uses: ID sensor Affects: Development bias Drum charge roller voltage
DRUM POTENTIAL CONTROL V_L Correction	Measures V_{LP} Sets V_{LG} = V_{SG}	Uses: ID sensor Affects: Exposure lamp voltage
COPY IMAGE CONTROL Auto ADS Gain Adjustment	Adjusts ADS sensor ouput voltage for the ADS sensor pattern to 2.7 ± 0.1 V.	Uses: ADS sensor output Affects: Development bias

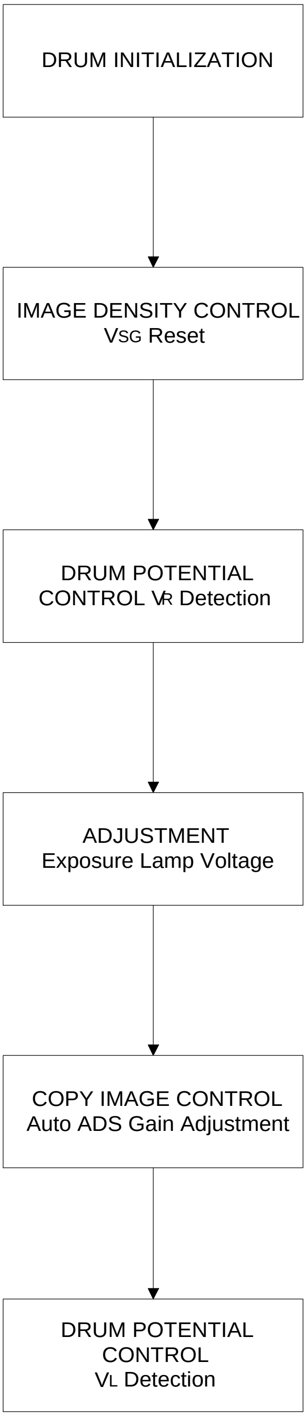
After Adding New Developer

The technician must do the following SP mode after adding new developer.

IMAGE DENSITY CONTROL TD Sensor Initial Setting	SP 2-214 Resets the TD sensor output to 2.5 ± 0.1 V Resets ID correction for the V_{SP} pattern to zero (this affects development bias and exposure lamp voltage)

After Installing a New Drum

The technician must do a series of SP modes to reset the process control parameters related to the drum.


DRUM INITIALIZATION
IMAGE DENSITY CONTROL V_{SG} Reset
DRUM POTENTIAL CONTROL V_R Detection
ADJUSTMENT Exposure Lamp Voltage
COPY IMAGE CONTROL Auto ADS Gain Adjustment
DRUM POTENTIAL CONTROL V_L Detection

SP 3-123
Resets the following
V_R correction level
V_L correction level
T/H correction level
Drum rotation time

SP 3-001
Adjusts V_{SG} to 4 ± 0.2 V

SP3-112
Detects the initital V_R
value for the new drum

SP4-001
See "Removal and Adjustment -
Copy Quality Adjustments"

SP 4-201
Adjusts the ADS sensor
output to 2.7 ± 0.1 V

SP 3-105
Detects the initial V_{LP}/V_{LG}
value for the new drum

Development bias, drum charge voltage, and exposure lamp voltage

The following table shows how process control affects development bias, drum charge, and exposure lamp voltages for various machine operations.

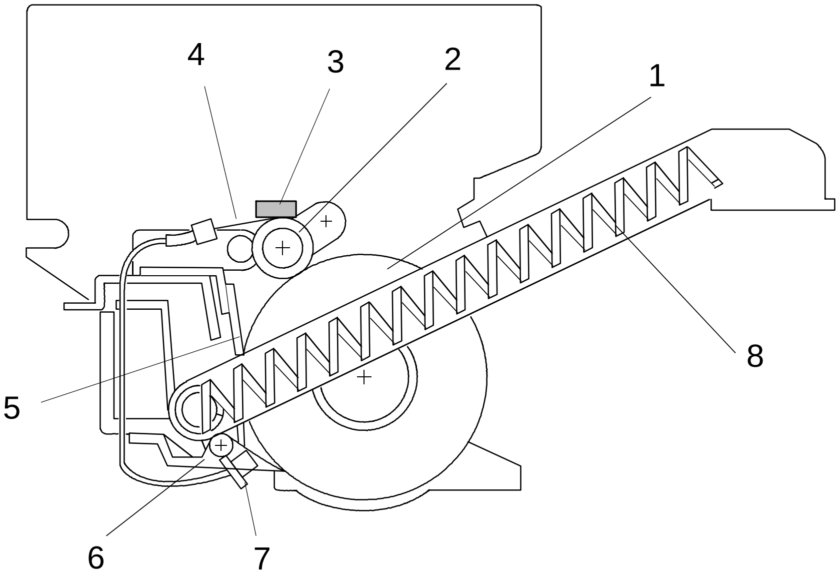
Mode			Development Bias [V]	Drum Charge Voltage [V]	Exposure Lamp Voltage [V]
Copying	**ADS mode**		(–240) + ADS correction + Reproduction ratio correction + V_R correction + B	(–1500) + V_R correction + T/H correction + C	Vexp + V_L correction
	Manual ID mode	**ID Level 1 ~ 6**	(–240) + Manual ID correction + Reproduction ratio correction + V_R correction + B		Vexp + Manual ID correction + V_L correction
		ID Level 7	(–240) + Lightest ID level dev.bias + Reproduction ratio correction + V_R correction + B		
VSP Pattern Detection			(–300) + BP + ID correction	(–1300) + T/H correction + CP	0
VR Pattern Detection			0	(–1500) + V_R correction + T/H correction + C	0
V_L Pattern Detection	**Forced V_L Detection**		BL + V_R correction + V_{BL} (ID)		Vexp
	V_L Detection		BL + (–25) + V_R correction + V_{BL} (ID)		Vexp + V_L correction
Non Image Area			(–200) + V_R correction + V_{BL} (ID)	0	0
Auto ADS Gain Adjustment			0	0	Vexp + V_L correction

NOTE:

B = Development bias adjustment factor, selected with SP2-201-001.
BP = Correction to the development bias used for making for V_{SP} patterns, selected with SP2-203.
BL = The value of the development bias that was reached during the most recently performed forced V_L detection routine.
V_{BL} (ID) = ID compensation factor based on the current ID correction used for making V_{SP} patterns.
C = Correction to the drum charge voltage, selected with SP2-001.
CP = Correction to the drum charge voltage for maknig V_{SP} patterns, selected with SP2-003.
Vexp = Exposure lamp voltage, selected with SP4-001.

2. DRUM

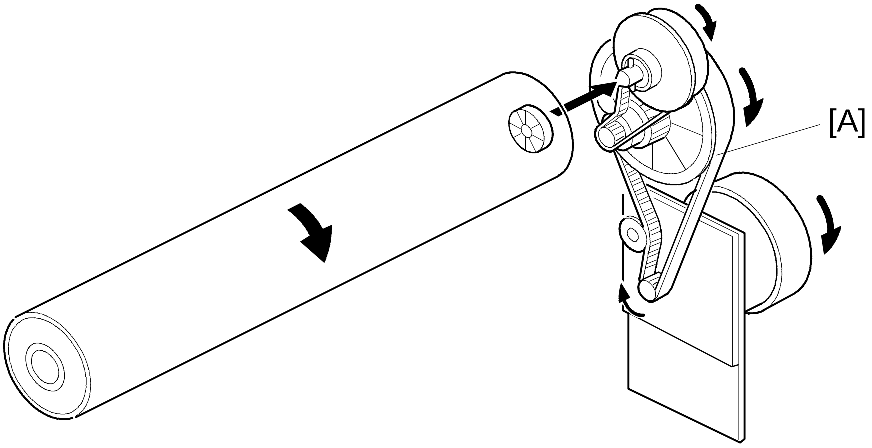
2.1 DRUM UNIT

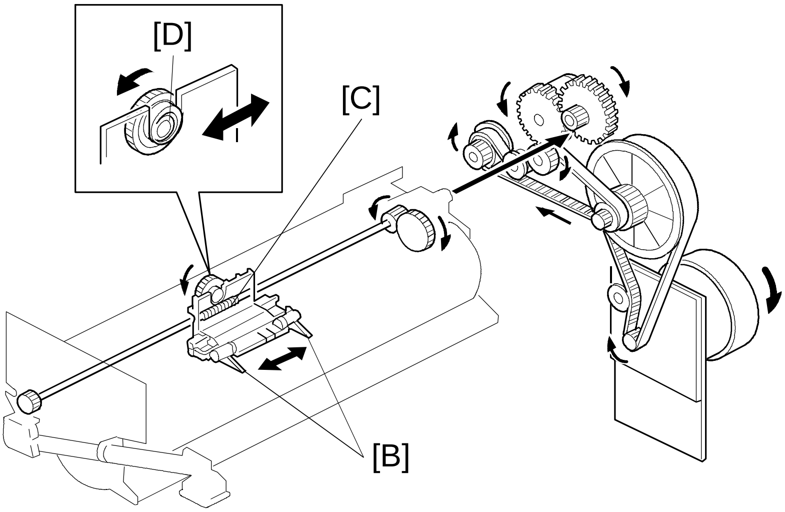


The drum unit consists of the components shown in the above illustration. An organic photoconductor (OPC) drum (diameter: 60 mm) is used for this model.

1. OPC Drum	5. Cleaning Blade
2. Drum Charge Roller	6. Pick-off Pawl
3. Drum Charge Roller Cleaner	7. ID Sensor
4. Drum Charge Thermistor	8. Recycled Toner Transport Coil

2.2 DRIVE MECHANISM

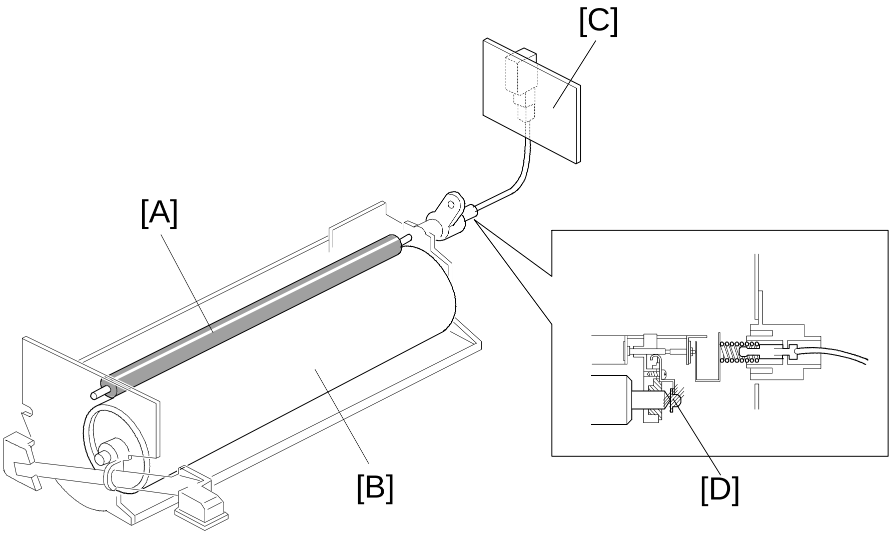




The drive from the main motor is transmitted to the drum drive pulley via the timing belt [A]. The pick-off pawls [B] are always in contact with the drum surface under a weak spring pressure. They move from side to side during the copy cycle. This movement is made with a worm gear [C] and an eccentric cam gear [D].

3. DRUM CHARGE

3.1 OVERVIEW



This copier uses a drum charge roller system instead of a corona wire scorotron system to charge the drum. For the copy image area or during process control, the drum charge roller [A] contacts the surface of the OPC drum [B] to give a sufficient negative charge.

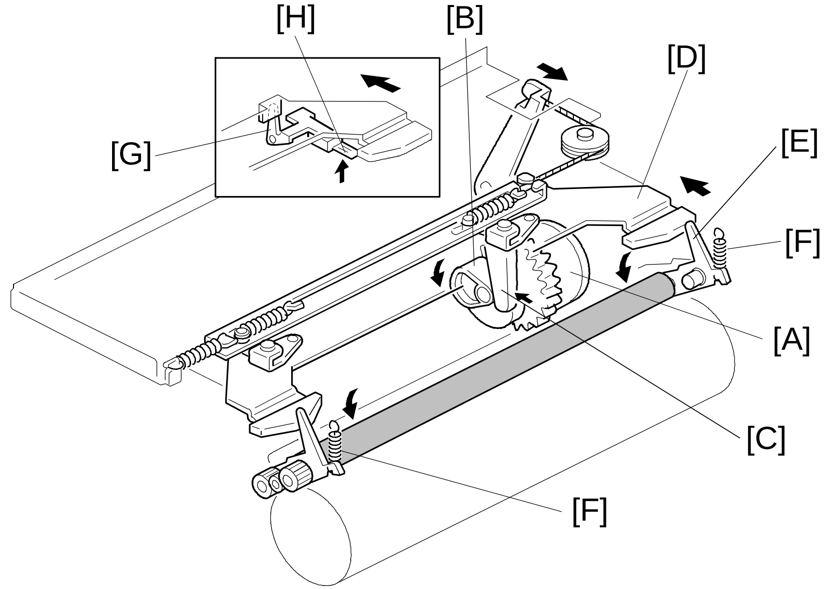
The drum charge roller system has the following advantages over the corona wire scorotron system:

- The amount of ozone generated during drum charging is less than 1/100 of that for a corona wire scorotron system.
- The applied voltage is 1/2 ~1/3 that of a wire scorotron system.
- The efficiency of drum charging is high.

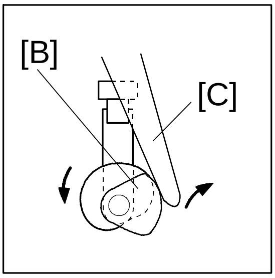
Thanks to the above advantages, no ozone filter is required for this copier.

The CB high voltage supply board [C] gives a constant dc voltage of –1500 V (–1300 V for the VSP pattern) to the drum charge roller at the charge roller terminal [D]. This gives the drum surface a negative charge of –900 V (–600 V for the VSP pattern).

3.2 DRUM CHARGE ROLLER DRIVE MECHANISM

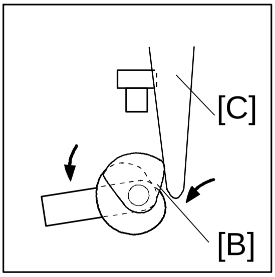


Home Position



The drum charge roller is away from drum

During Image Processing

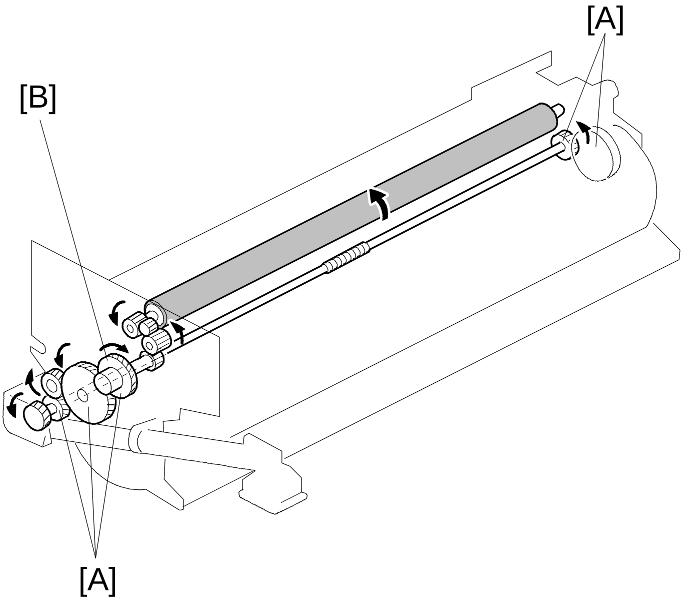


The drum charge roller contacts the drum

To prevent toner from adhering to the drum charge roller and to prevent the drum charge roller from sticking to the OPC drum, the drum charge roller contacts the OPC drum only under the following conditions:

(1) When the image processing area comes under the drum charge roller
(2) When process control is executed.

This function is performed by the transfer belt contact clutch [A] (a one-third turn clutch) with cam [B] located on the rear side plate of the copier. When the clutch [A] is driven one third of a complete rotation, the cam [B] downs up the lever [C]. The lever is linked with the plate [D] which releases the on-off lever [E] of the drum charge roller. Then the drum charge roller contacts the drum as a result of the pressure from the two springs [F]. At the same time, plate [D] also pushes the lever [G] on the drum charge thermistor [H]. Then, the drum charge thermistor moves away from the drum charge roller. When the start key is pressed, the temperature around the drum chanrge roller is measured while the drum charge thermistor contacts the drum charge roller. After that, the temperature is measured while the drum charge thermistor is away from the drum charge roller.



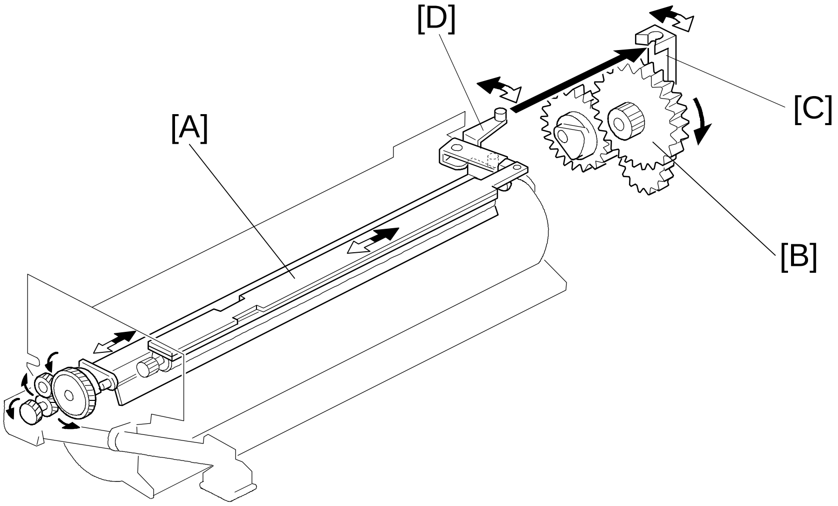
When the drum charge roller does not contact the drum, the drum charge roller is driven by the main motor through some gears [A]. (The roller speed is 50 rpm for A153, A155, and A156 copiers, and 37 rpm for A157, A159, and A160 copiers.) At this time, the roller touches the cleaning pad, and this helps keep the roller clean, although a cleaning routine automatically takes place at the end of every copy cycle (see below).

When the drum charge roller contacts the drum, the force (torque) imparted by the drum becomes greater than the force transmitted through the clutch [B]. Then, the drum charge roller rotates with the drum rotation.

The drum charge roller comes away from the drum after every copy job. For 2 seconds after the end of every copy job and for 10 seconds after every copy interval set by SP2-901, the drum charge roller is driven by the main motor via gears [A] for cleaning (see "Drum Charge Roller Cleaning").

After cleaning, the main motor stops. While the main motor is not rotating, the drum charge roller is kept away from the drum. This prevents the drum charge roller from adhering to the drum.

3.3 DRUM CHARGE ROLLER CLEANING



If the drum charge roller gets dirty, drum charge efficiency decreases. This affects the copy quality, for example causing vertical white lines.

While the drum charge roller is away from the drum but still rotating, it brushes against the cleaning pad [A], which helps to keep it clean.

However, there is a specific drum charge roller cleaning routine which is described below. It is executed at the following intervals:

(1) For 2 seconds at the end of every job
(2) For 10 seconds after the copy job interval set by SP2-901.

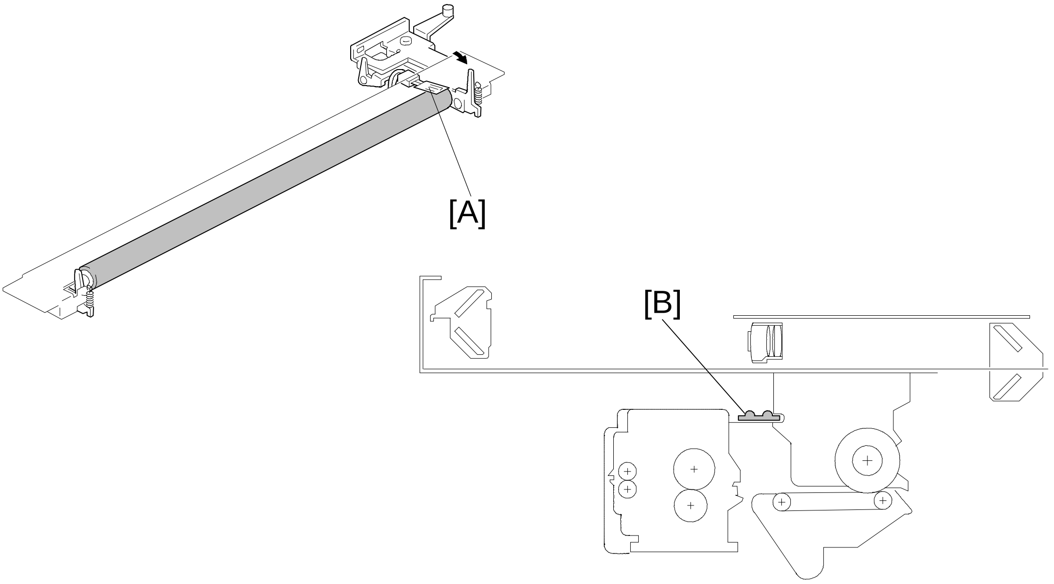
After the copy job, the drum charge roller comes away from the drum and contacts the drum charge roller cleaner pad [A]. The main motor still rotates during cleaning and drives the gear [B] to swing the lever [C] via an eccentric cam. This lever swings the arm [D] and the arm gives a side-to-side movement to the drum charge roller cleaner.

The cleaning interval set by SP2-901 is as follows:

SP2-901 setting: 0: Every 1000 copies (10 seconds) [default]
1: Every 500 copies (10 seconds)
2: Every 200 copies (10 seconds)
3: Every 100 copies (10 seconds)

For a user who mainly makes consecutive high volume copy runs, the drum charge roller is likely to get dirty early, because the interval between jobs (and thus the interval between end-of-copy-job cleaning runs) is longer than for small volume intermittent copy runs. In this case, the copy count interval for cleaning must be reduced with SP2-901, to have the ten-second cleaning routine done more often.

3.4 TEMPERATURE COMPENSATION



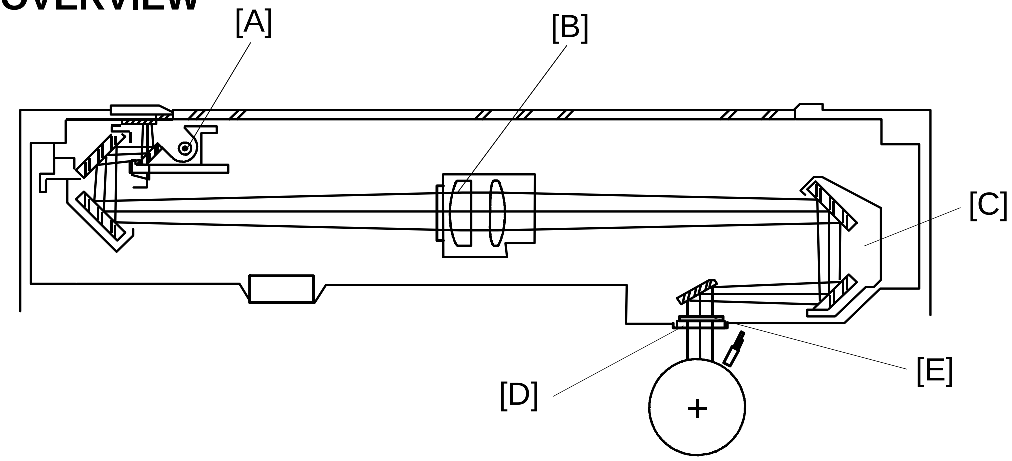
The required applied voltage varies with the temperature around the drum charge roller. The lower the temperature is, the higher the applied voltage required. This affects the drum charge efficiency.

To compensate for these characteristics, the drum charge thermistor [A] detects the temperature around the drum charge roller. Before the copy job starts, the drum charge thermistor contacts the drum charge roller, T/H correction for the first copy uses the temperature detected while the drum charge thermistor contacts the drum charge roller. After the coy job starts, the thermistor is away from the drum charge roller. After the 2nd copy, T/H correction uses the temperature detected while the drum charge thermistor is away from the drum charge roller. Using the detected temperature, T/H correction is performed. (See "T/H correction" in the Process Control section for details.)

To avoid low drum charge efficiency for the first copy after the main switch is turned on, there is a drum heater [B] located over the drum and drum charge roller. This heater is turned on while the copier main switch is turned off. It keeps the temperature around the drum and drum charge roller over 15°C. For this heater to operate, the power cord of the copier must be plugged in even when the main switch is turned off.

4. OPTICS

4.1 OVERVIEW

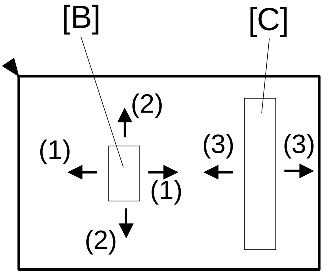


The optics unit reflects an image of the original on the exposure glass onto the OPC drum. This forms a latent electrical image of the original.

In this model, a halogen lamp is used for the exposure lamp [A]. The lamp surface is frosted to ensure even exposure. The specifications of the lamp are as follows. Note that the A153/155/156 models are faster, so they need more light during exposure.

	115V Machines	230V Machines
A153/A155/A156	97V 280W	85V 280W
A157/A159/A160	97V 200W	85V 200W

Six mirrors are used to make the optics unit smaller and obtain a wide reproduction ratio range (50 ~ 200%).



The lens [B] is driven by two stepper motors for (1) vertical movement (parallel to the paper feed direction) and (2) horizontal movement. Also, to correct for focal length change in reduction and enlargement modes, the third scanner unit [C] (4th and 5th mirrors) is moved (3) vertically (parallel to the paper feed direction) by another stepper motor.

A toner shield glass [D] and a green filter [E] are installed above the OPC drum to improve red original reproduction.

The CPU monitors the temperature around the optics cavity through a thermistor which is under the left scale. When the detected temperature reaches a certain threshold value (see the following table), the optics cooling fan(s) on the rear of the optics side plate starts to draw cool air into the optics cavity. The hot air exits through the vents in the upper cover. The fan(s) operate until the temperature drops below the threshold temperature. Note that the A153/155/156 models have two fans; this is because the exposure lamp is more powerful in this model, so more cooling is needed.

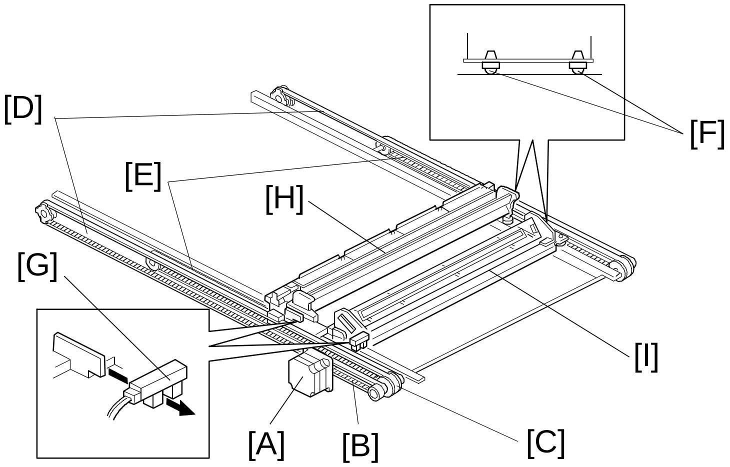
	A153/A155/A156	**A157/A159/A160**
Rotating temperature	45°C	40°C
Number of fans	2	1

The thermofuse (located on the 1st scanner) provides back-up overheat protection. It opens at 121°C and removes ac power to the exposure lamp. The thermofuse is not resettable.

An optics anti-condensation heater is available as optional equipment (it is also a service part). To prevent moisture from forming on the optics, it turns on while the main switch is turned off.

The main board controls the exposure lamp voltage through the ac drive board. The exposure lamp voltage is based on the base lamp voltage (set by SP4-001) and various correction factors. The corrections depend on whether the image density is manually selected or whether ADS mode is selected. For details, see Process Control - Summary.

4.2 SCANNER DRIVE



In this model, a stepper motor [A] drives the scanners via a timing belt [B], scanner drive pulley [C], and two long & short scanner drive belts [D,E]. To prevent skewing, both ends of each scanner are driven. The scanners have sliders [F], which ride on guide rails.

Unlike previous models, the scanner drive pulleys are made of aluminum. Also, bearings at the ends of the scanner drive pulley shaft assure reliable scanner speed and movement. The timing belt tension has increased as well.

The scanner home position is detected by the home position sensor [G]. The main CPU sends the appropriate pulses to the scanner drive motor (determined from the detected original size) to determine the scanner return position.

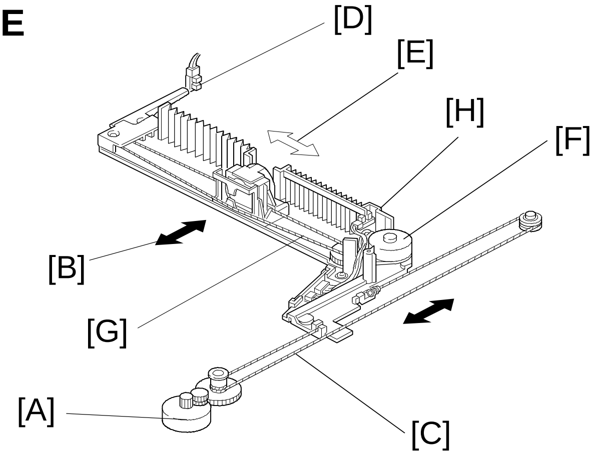
The first scanner [H], which consists of the exposure lamp and the first mirror, is connected to the two long scanner drive belts with belt clamps. The second scanner [I], which consists of the second and third mirrors, is connected to the two short scanner drive belts with belt clamps.

The first scanner drive speed in full size mode is:
200 (mm/s) for A153/A155/A156 copiers
150 (mm/s) for A157/A159/A160 copiers
The first scanner drive speed for a selected reproduction ratio is:
200/M (mm/s) for A153/A155/A156 copiers
150/M (mm/s) for A157/A159/A160 copiers

NOTE: M = Selected reproduction ratio (0.5 - 2.0)

The second scanner moves at half the velocity, and the returning speed of the first scanner is 1150 (mm/s) for all models.

4.3 LENS DRIVE



– Vertical (Parallel to the Paper Feed Direction) –

The lens vertical drive motor [A] changes the vertical position [B] of the lens in accordance with the selected reproduction ratio (50 ~ 200%). The motor, which is a stepper motor, drives the lens through the lens drive wire [C].

The lens vertical home position sensor [D] detects the vertical position of the lens for full size mode. The vertical position of the lens for the selected reproduction ratio is determined by the number of pulses from the full size position.

– Horizontal (Perpendicular to the Paper Feed Direction) –

The original’s horizontal position on the exposure glass varies depending on the mode (platen or ADF). This prevents problems such as skewing that are caused when the original moves too close to the rear scale in automatic feed mode. However, the center is the standard position for copy paper feed.

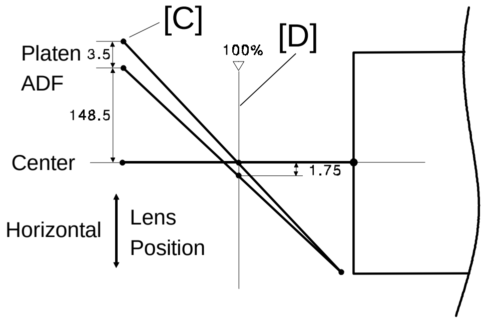
Therefore, the horizontal position [E] of the lens has to be changed in accordance with paper size, reproduction ratio, and original feed mode.

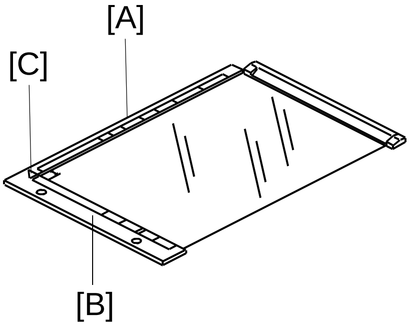
The lens horizontal drive motor [F] drives the lens through the lens drive wire [G]. The lens horizontal home position sensor [H] detects the horizontal position of the lens. The home position of the lens is the horizontal position for A4/LT sideways in full size and platen mode; the positions for other conditions are determined by counting the number of motor drive pulses from the home position.

Since this model has a horizontal lens drive mechanism, side-to-side registration adjustment for each feed station can be done easily using SP mode (SP4-011).

4.4 HORIZONTAL LENS POSITIONING

4.4.1 Original Alignment Position





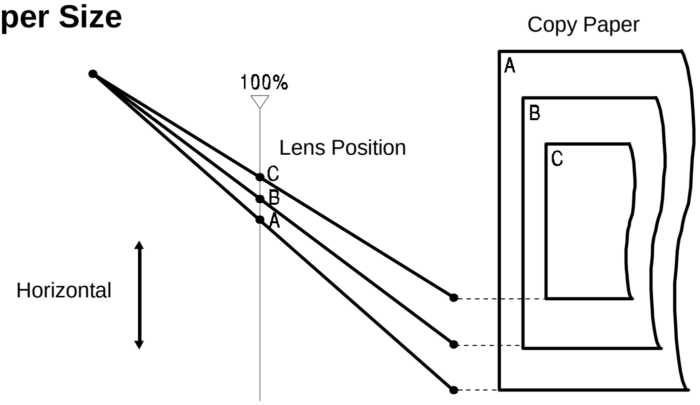
There are two standard original alignment positions: one for platen mode and one for ADF mode.

In platen mode, the original is aligned with both the rear [A] and the left [B] original scales (the rear left corner [C] is the standard alignment position).

In ADF mode, the original alignment position is 3.5 mm to the front of the platen mode original alignment position. This is to maintain the original transport path (which is at 3.5 mm from the rear scale).

On line [D] in the above diagram, you can see the horizontal positions of the lens for each original mode, with identical sizes of paper.

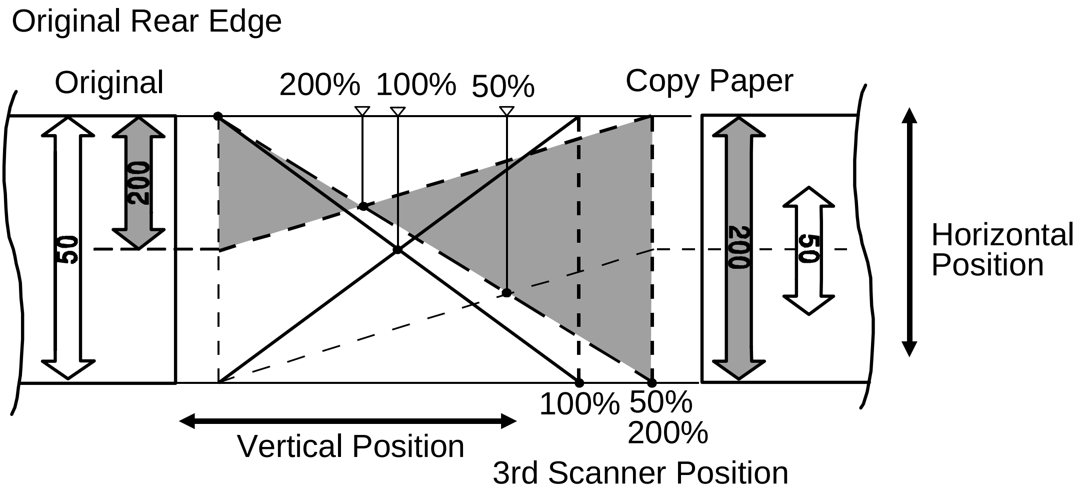
4.4.2 Paper Size



To maintain a high paper feed performance, the center line of the exposure glass is assigned to be the standard paper feed position. However, as described above, the original alignment position for original feed is not in the center of the exposure glass in this model. Therefore, the lens horizontal position has to be changed in accordance with the paper size.

The diagram shows the horizontal position of the lens for three paper sizes (A, B, and C) in full size mode.

4.4.3 Reproduction Ratio

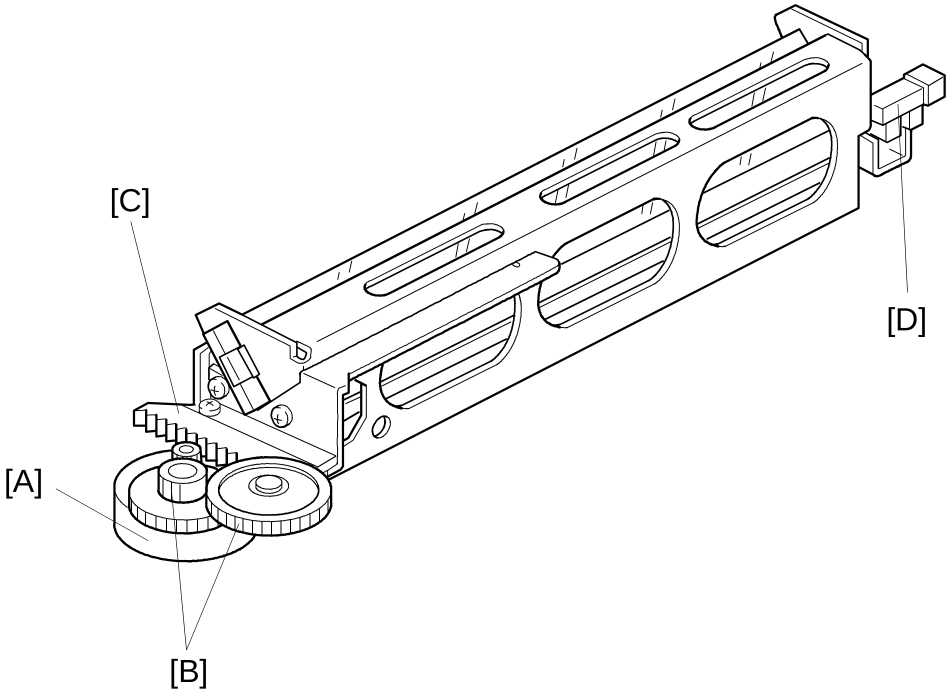

Original Rear Edge
Original
200%
100%
50%
Copy Paper
50
200
200
50
Horizontal Position
100%
50%
200%
Vertical Position
3rd Scanner Position

The horizontal position of the lens has to be changed when a reproduction ratio is selected. This is because the original is aligned at the rear left corner but the copy paper is fed down the center.

When the reproduction ratio is changed, the vertical position of the lens is changed. At the same time, the total focal length has to be changed to adjust the image focusing. For this focal length change, the vertical position of the 3rd scanner is also adjusted.

The figure shows the vertical and horizontal position of the lens for ratios of 50, 100 and 200%.

4.5 3RD SCANNER DRIVE

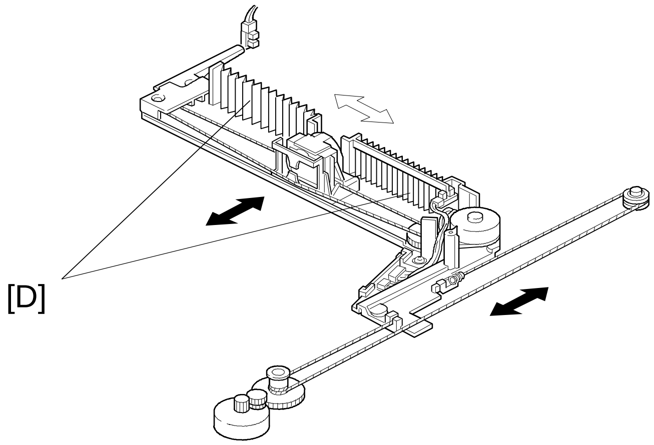


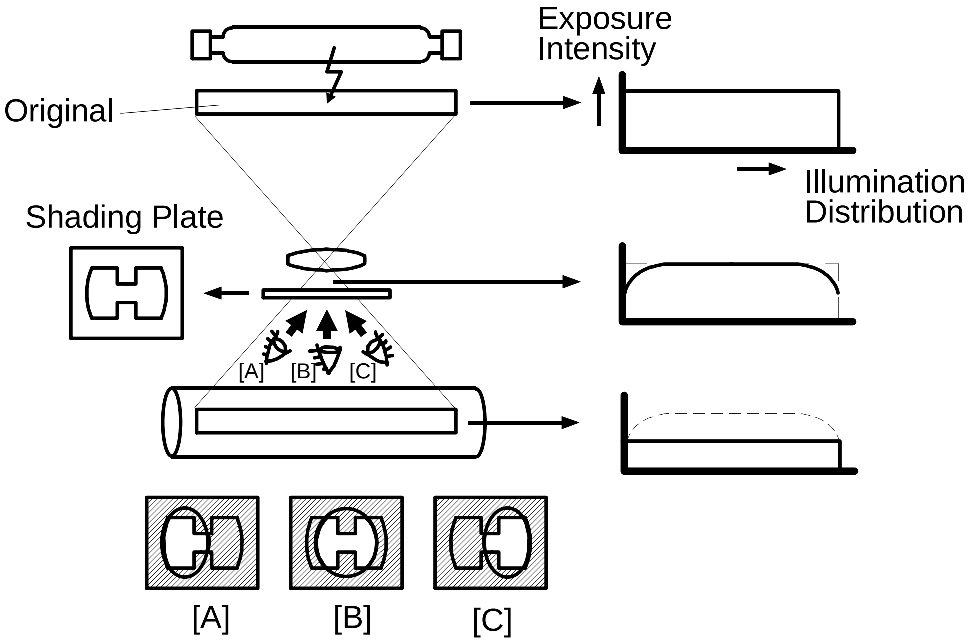
To compensate the focusing for reproduction and lens position changes, the 3rd scanner (4th and 5th mirrors) position is changed.

The 3rd scanner drive motor [A] (a stepper motor) changes the 3rd scanner position through the pinion gears [B] and the rack gear [C].

The 3rd scanner home position sensor [D] detects the 3rd scanner position for full size mode. The machine keeps track of the 3rd scanner position based on the number of motor drive pulses.

4.6 UNEVEN LIGHT INTENSITY CORRECTION



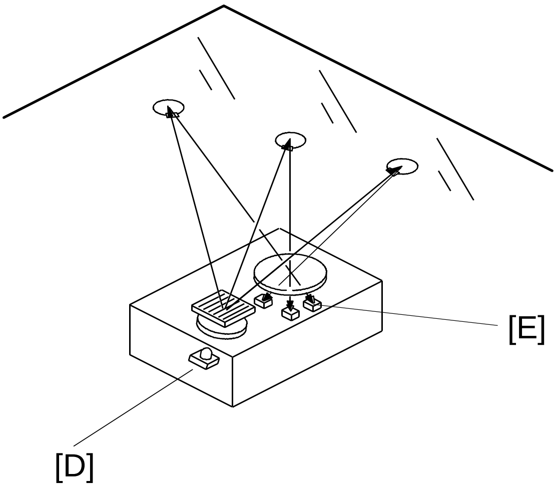

Exposure
Intensity
Original
Illumination
Distribution
Shading Plate
[A]
[B]
[C]
[A]
[B]
[C]

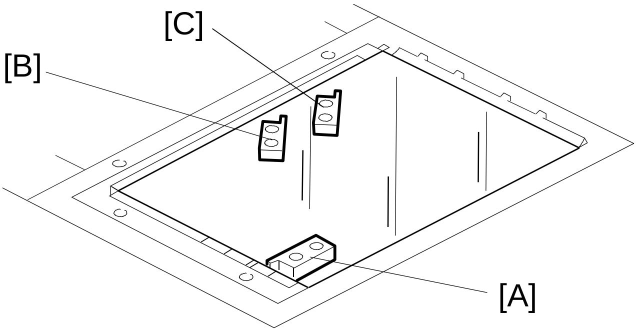
The entire exposure lamp surface is frosted to ensure even exposure.

To compensate for reduced light at the edge of the lens, a shading plate is placed in front of the lens. The shading plate is fixed to the lens unit.
The shading plate corrects the light intensity when the lens horizontal position is shifted (from [A] to [C]).

Also, two shading mylars [D] intercept any stray reflected light from outside the light path.

4.7 ORIGINAL SIZE DETECTION IN PLATEN MODE



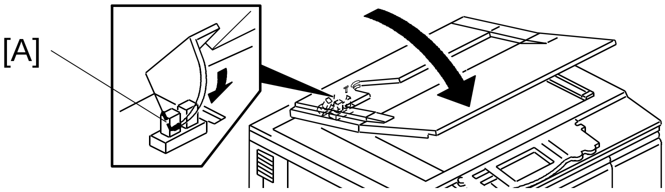


There are three reflective sensors in the optics cavity for original size detection. The Original Width Sensor [A] detects the original width and the Original Length Sensor-1 [B] and Original Length Sensor-2 [C] detects the original length. These are the APS (Auto Paper Select) sensors.

For North American models, there is an optional length sensor for detecting 11" x 15" originals.

Inside each APS sensor, there is an LED [D] and either three photoelectric devices [E] (for the width sensor) or one photoelectric device (for each length sensor). In the width sensor, the light generated by the LED is broken up into three beams and each beam scans a different point of the exposure glass (in each length sensor, there is only one beam). If the original or platen cover is present over the scanning point, the beam is reflected and each reflected beam exposes a photoelectric device and activates it.

While the main switch is on, these sensors are active and the original size data is always sent to the main CPU. However, the main CPU checks the data only when the platen cover is opened.



Original Size		Length Sensor			Width Sensor		
A4/A3 version	**LT/DLT version**	1	2	Op	3	4	5
A3	11" x 17"	O	O	O	O	O	O
—	(11" x 15")	O	O	X	O	O	O
B4	10" x 14"	O	O	O	O	O	X
F4	81/2" x 14"	O	O	O	O	X	X
F	8" X 13"	O	O	O	O	X	X
A4–L	81/2" x 11"	X	O	O	O	X	X
B5–L	—	X	O	O	X	X	X
A5–L	51/2" x 81/2"	X	X	O	X	X	X
A4–S	11" x 81/2"	X	X	O	O	O	O
B5–S	—	X	X	O	O	O	X
A5–S	81/2" x 51/2"	X	X	O	O	X	X

Note: –L= Lengthwise, –S = Sideways, O = High (Paper Present), X = Low

The original size data is taken by the main CPU when the platen position sensor [A] is activated. This is when the platen is positioned about 15 cm above the exposure glass. At this time, only the sensor(s) located underneath the original receive the reflected light and switch on. The other sensor(s) are off. The main CPU can recognize the original size from the on/off signals from the five sensors.

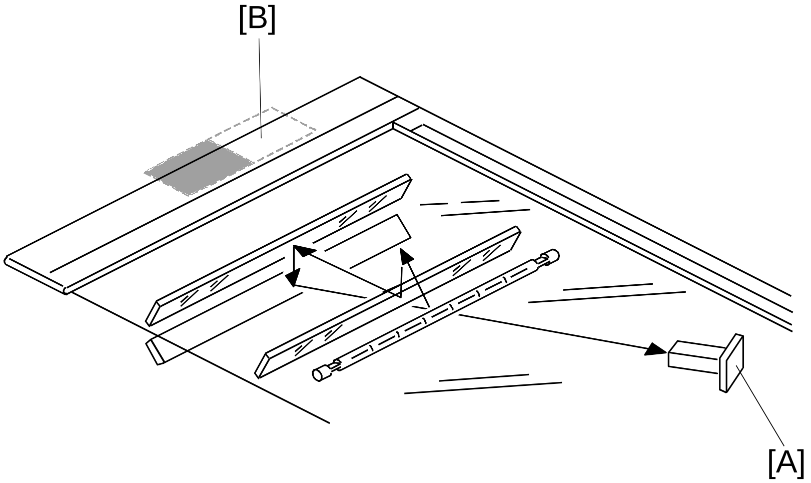
If the copy is made with the platen open, the main CPU decides the original size only from the sensor outputs when the Print key is pressed.

The above table shows the outputs of the sensors for each original size. The third length sensor (shown as "Op") is the optional length sensor for detecting 11" x 15" originals in North American models.

This original size detection method eliminates the necessity for a pre-scan and increases the machine’s productivity.

Original size detection using the ARDF is described in the manual for the ARDF.

4.8 AUTOMATIC IMAGE DENSITY CONTROL SYSTEM (ADS)



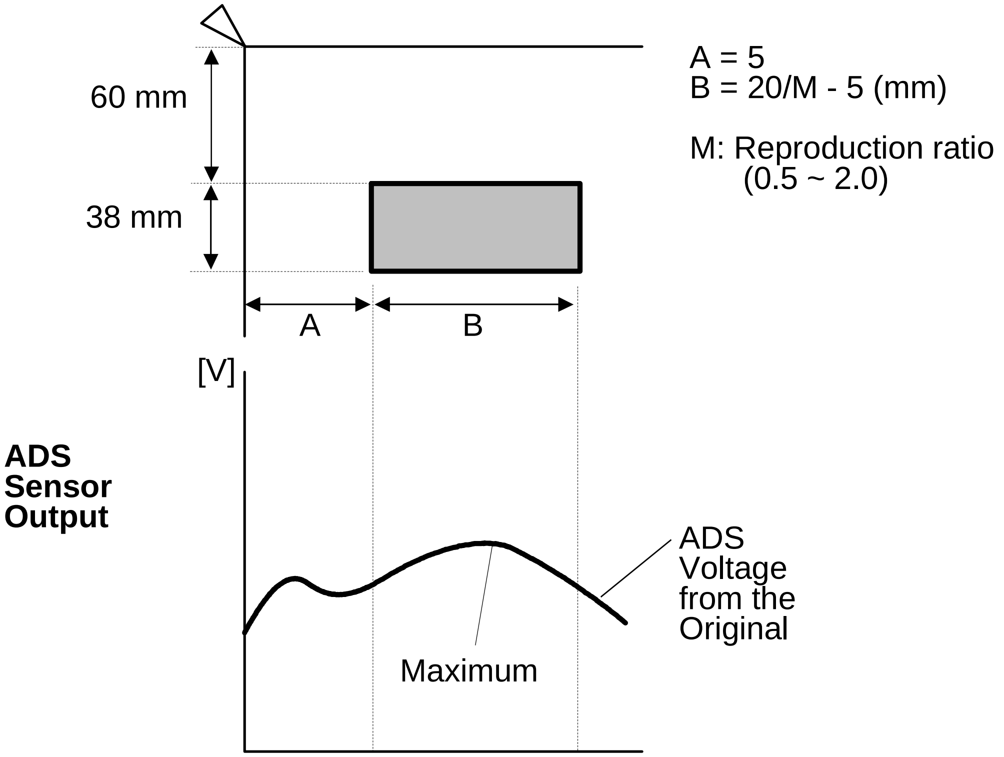
Just before taking a copy in ADS (Auto Image Density Select) mode, the ADS sensor [A] measures the original background density and the main CPU changes the development bias for the original to prevent dirty background from appearing on the copy. The exposure lamp voltage is fixed at the manual ID level 4 value (set by SP4-001) regardless of the input from the ADS sensor.

The ADS sensor board is mounted on the rear side of the optics side plate. The sensor board is covered by the sensor housing cover which has a small hole to allow light reflected from the original to reach the ADS sensor.

ADS Sensor Gain Adjustment (Every 1,000 Copies)

To maintain consistent image quality regardless of changes in the components of the optic path with time, the ADS sensor reference voltage is adjusted to 2.7 ± 0.1 V every 1K copies. The exposure lamp turns on at ID level 4, and the light reflected by the white ADS pattern [B] reaches the ADS sensor. The CPU adjusts the ADS gain value to make the output (V_{ADS} pattern) equal to 2.7 ± 0.1 V. The gain value is stored in the RAM board.

If the output cannot be made to equal 2.7 ± 0.1 Volts even if the gain is adjusted as far as it will go, the machine generates a Service Call code.



During Copying

To maintain good copy quality, the development bias changes depending on the background density detected by the ADS sensor.

In full size mode when the user selects ADS, the CPU samples the ADS sensor output across the original from 5 mm to 15 mm from the left scale edge. The CPU takes the maximum ADS sensor output during the sampling period and compares it with the ADS reference voltage (V_{ADS} [pattern]; see the previous page). Based on this comparison, the machine may adjust the development bias to eliminate dirty background (see the Process Control - ADS Correction section for details).

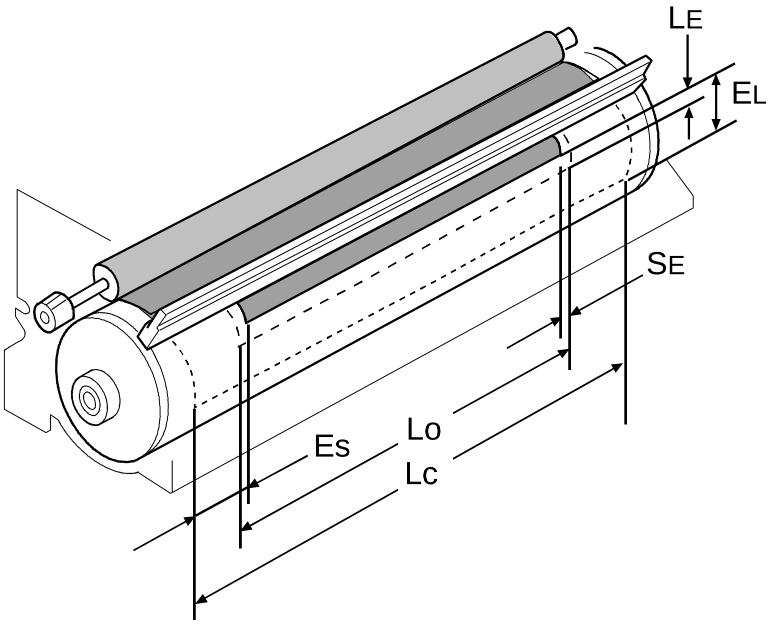
The sampling length of the ADS sensor output for the original differs depending on the reproduction ratio because the scanner speed is different.

Sampling is performed on each copy. (If more than one copy is made of the same original, sampling is only done for the first copy run.)

Note: There is an optional extra ADS sensor for users who have copy quality problems with certain types of red original.

5. ERASE

5.1 OVERVIEW



LE: Leading edge erase margin: 3.5 ± 2.5 mm
SE: Side erase margin: total of both sides is 3 mm or less
Lo: Original width
Lc: Charged width of the drum
EL: Leading edge erase
Es: Side erase

The erase lamp unit consists of a row of 54 LEDs extending across the full width of the drum. In erase mode (center erase or side erase), the appropriate LEDs turn on in accordance with the modes selected by the user.

5.2 LEADING EDGE AND TRAILING EDGE ERASE

The entire row of LEDs turns on when the main motor turns on. They stay on until the erase margin slightly overlaps the leading edge of the original image on the drum (leading edge erase margin). This prevents the shadow of the original’s leading edge from appearing on the copy paper. This leading edge erase margin is also necessary for the leading edge of the copy paper to separate from the hot roller.

When the scanner reaches the return position, the drum charge roller and the exposure lamp turn off. However, the charged length on the drum surface is a little longer than the actual original length to make sure that there is a complete image of the original.

The entire row of LEDs turn on when the trailing edge of the latent image has passed under the erase lamp unit. This prevents developing unnecessary parts of the drum surface, reducing toner consumption and the drum cleaning load.

The LEDs stay on to erase the leading edge of the latent image in the next copy cycle. After the final copy, the erase lamps turn off at the same time as the main motor.

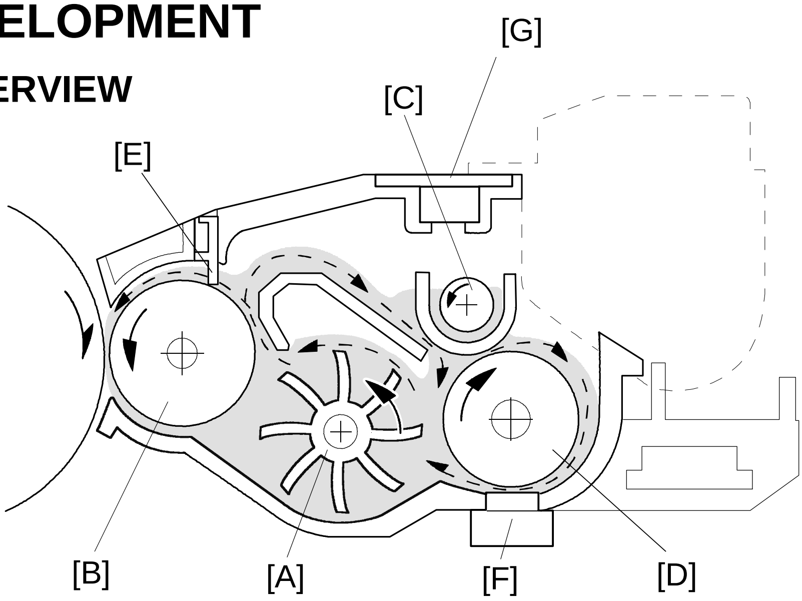
The leading and trailing edge margins can be adjusted with SP2-101-001 and SP2-101-002 respectively.

5.3 SIDE ERASE

Based on the combination of copy paper size and the reproduction ratio, the LEDs turn on in blocks. This prevents the shadow of the original side edge and the unexposed front and rear sides of the drum surface in reduction mode from being developed. This reduces toner consumption and the drum cleaning load.

6. DEVELOPMENT

6.1 OVERVIEW



When main motor rotation is transmitted to the development unit, the paddle roller [A], development roller [B], auger [C], and agitator [D] start turning. The paddle roller picks up developer in its paddles and transports it to the development roller. Internal permanent magnets in the development roller attract the developer (which is about 70 µm in diameter) to the development roller sleeve.

The turning sleeve of the development roller then carries the developer past the doctor blade [E]. The doctor blade trims the developer to the desired thickness and creates developer backspill into the cross-mixing mechanism.

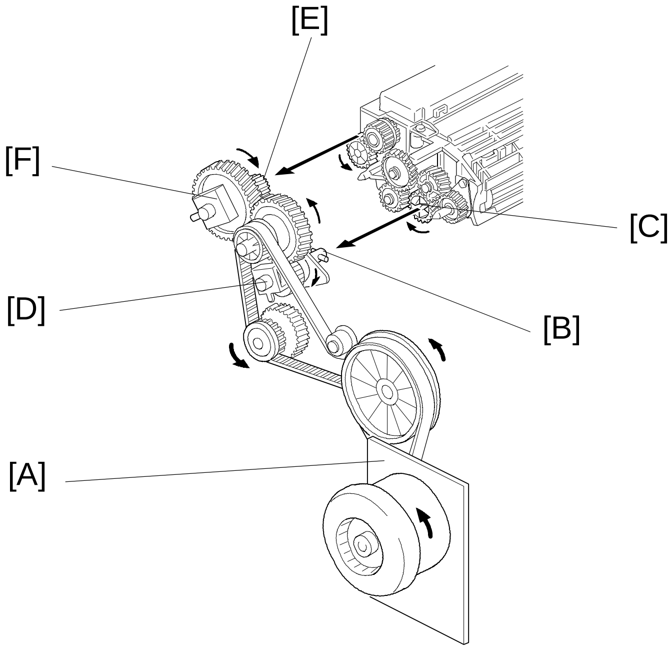
The development roller continues to turn, carrying the developer to the OPC drum. When the developer brush contacts the drum surface, the negatively charged areas of the drum surface attract and hold the positively charged toner. In this way, the latent image is developed.

Negative bias is applied to the development roller to prevent toner from being attracted to the non-image areas on the drum, which may have a residual negative charge. The bias also controls image density.

After turning about 100 degrees more, the development roller releases the developer into the development unit. The developer is agitated by the paddle roller, agitator, and cross-mixing mechanism.

The toner density sensor [F] located under the unit measures the toner concentration in the developer. A hole, fitted with a filter [G], has been made in the top of the unit to relieve air pressure and to minimize toner scattering.

6.2 DRIVE MECHANISM

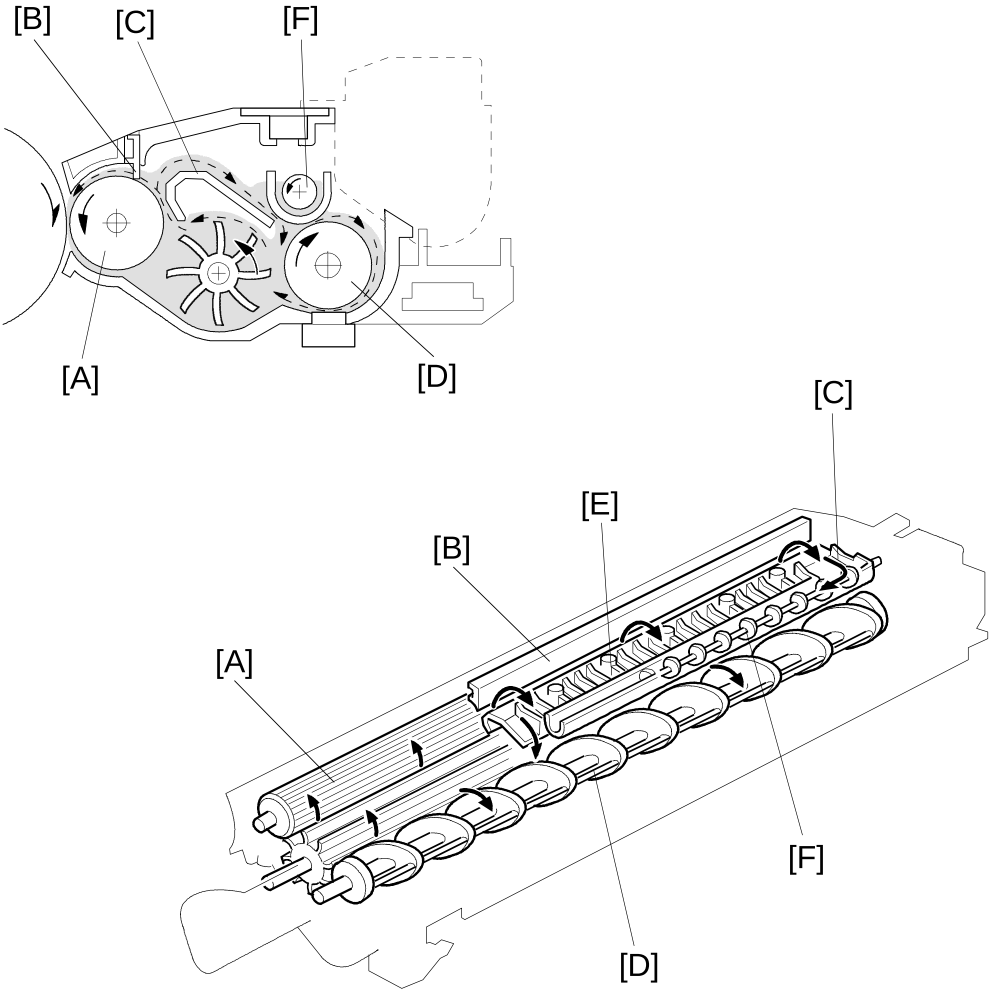


When the main motor [A] turns, the rotation is transmitted from the development drive shaft [B] to the paddle roller gear [C] through the development clutch [D].

The gears of the toner supply unit are driven by the toner supply roller drive gear [E] when the toner supply clutch [F] activates.

All gears on the development unit are helical gears. These gears are quieter than normal gears. The development drive shaft engages the development roller gear when the development unit is pushed in.

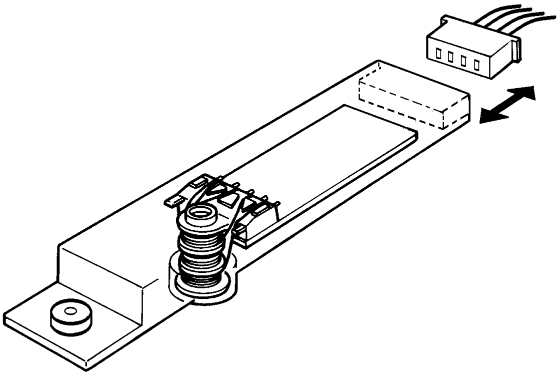
6.3 CROSS-MIXING

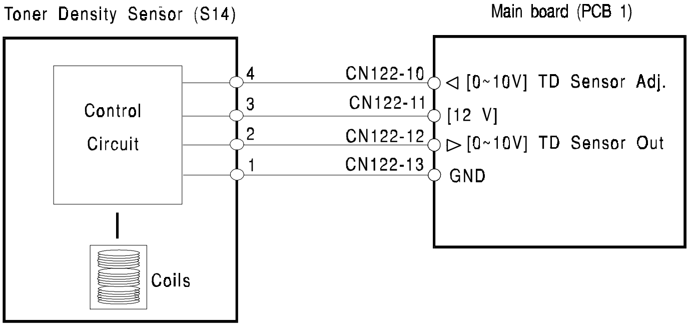


This copier uses a standard cross-mixing mechanism to keep the toner and developer evenly mixed. The developer on the turning development roller [A] is split into two parts by the doctor blade [B]. The part that stays on the development roller forms the magnetic brush and develops the latent image on the drum. The part that is trimmed off by the doctor blade goes to the backspill plate [C].

As the developer slides down the backspill plate to the agitator [D], the mixing vanes [E] move it slightly toward the rear of the unit. Part of the developer falls into the auger inlet and is transported to the front of the unit by the auger [F]. As a result of this mechanism, the developer stays level in the development unit.

6.4 TONER DENSITY SENSOR




Toner Density Sensor (S14)
Main board (PCB 1)
Control Circuit
Coils
4
3
2
1
CN122-10
CN122-11
CN122-12
CN122-13
◁ [0~10V] TD Sensor Adj.
[12 V]
▷ [0~10V] TD Sensor Out
GND

A toner density sensor (the TD sensor) is installed under the development unit. It works in conjuction with the ID sensor to control the amount of toner in the developer mixture.

The toner density sensor has two basic functions. First, it controls the toner supply when the toner density is greater than the upper limit or less than the lower limit. The ID sensor input is ignored. If the amount of toner in the developer is greater than the upper limit (in this case, if the toner density sensor output, Vt, is less than 1.5V), toner supply is prohibited. Second, it takes over toner supply control completely when TD sensor supply mode is selected with SP2-208-001.

The toner density sensor receives 12 volts from CN122-11 of the main board. The sensor's sensitivity is set by the control signal applied at CN122-10. The input signal from the sensor comes in at CN122-12. This is an analog signal. When the toner density is within the standard range, the analog signal is within the range given below. In this model, the ID sensor has more priority over toner supply control than the TD sensor, so the TD sensor does not have to be controlled so precisely. As a result, the standard range is wider than in previous models.

Standard Range: $1.5\text{V} \leq Vt \leq [\text{Initial Setting } (2.5 \pm 0.1) + 1.0]\ \text{V}$

6.5 DEVELOPMENT BIAS CONTROL

The actual development bias voltage applied depends on various process control corrections that are added to the base voltage. These are explained in Process Control section (see the Summary section for a quick-look reference).

In addition, the technician can adjust the base development bias voltage using SP mode 2-201-001 as shown below.

Darker ↔ Lighter

SP2-201-1 Setting	**1**	**2**	**3**	**4**	***5**	**6**	**7**	**8**	**9**
Development Bias Correction Voltage	+80 V	+60 V	+40 V	+20 V	±0 V	–20 V	–40 V	–60 V	–80 V

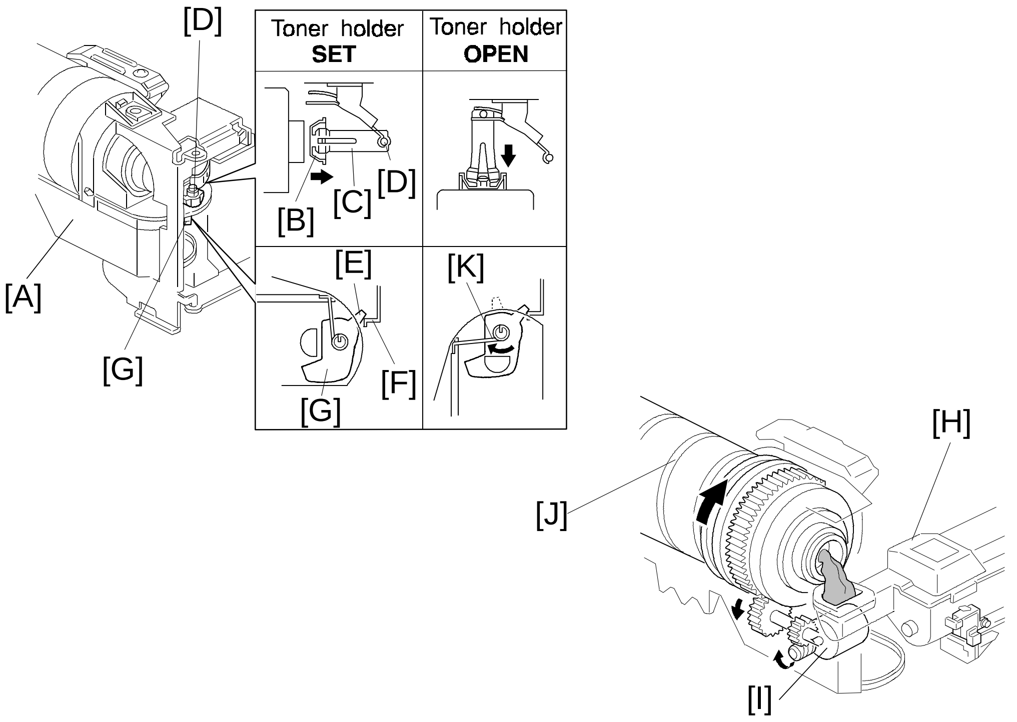
*: Factory setting

This adjustment should be done only if exposure lamp voltage adjustment (SP4-001) fails to achieve the desired image density.

The correction selected here does not affect toner supply control or pattern detection, as it is not applied when developing sensor patterns on the drum, and the bias control system is different (see Process Control for full details).

6.6 TONER SUPPLY

6.6.1 Toner Bottle Replenishment Mechanism



When a toner cartridge is placed on the holder unit [A] and pushed back in completely, the following procedures are automatically performed to supply toner to the toner supply unit.

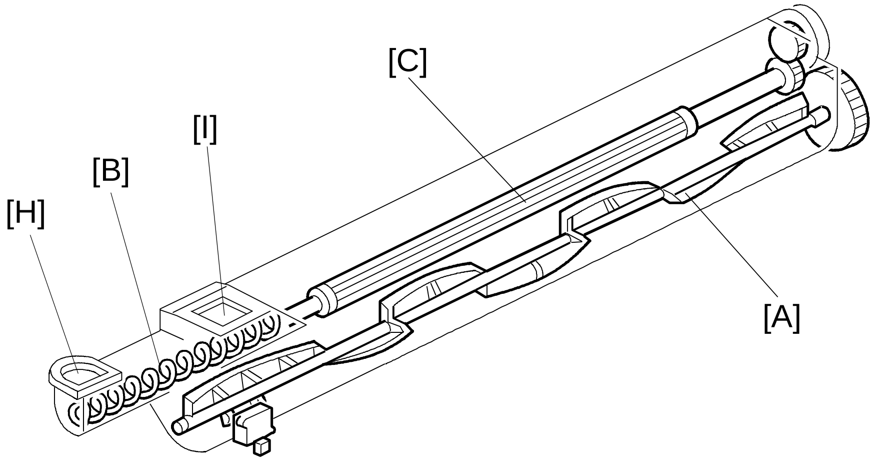
- The cap [B] remaining on the toner bottle is pulled away and kept by the chuck [C] away from the movement of the roller [D], which rides along the curved rail.
- The toner shutter lever [E] meets the bracket [F] on the copier frame and the toner shutter [G], which covers the hole above the toner supply unit opening, is opened.

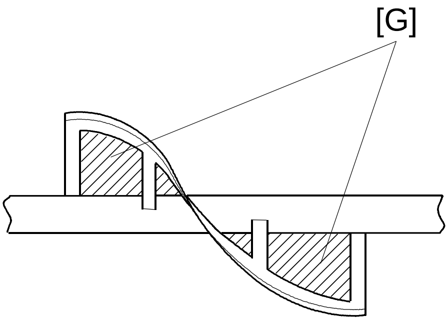
The bottle drive mechanism transports toner from the bottle to the toner supply unit [H]. A worm gear on the bottle drive motor [I] drives this mechanism. The toner bottle has a spiral groove [J] that helps move toner to the toner supply unit.

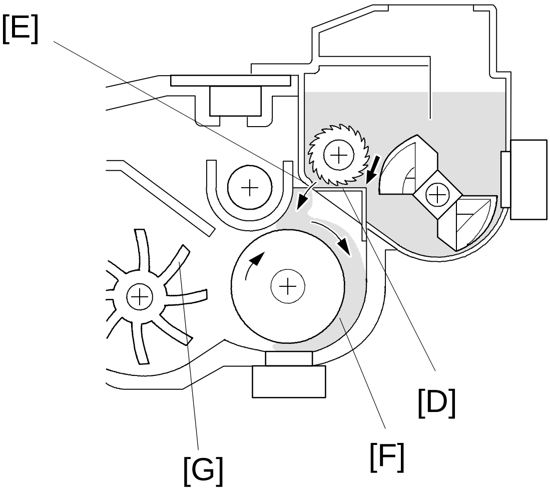
When the holder unit is pulled out to add new toner, the following procedures are performed automatically to prevent toner from scattering.

- The chuck releases the toner bottle cap into its proper position.
- The toner shutter shuts the opening as a result of the pressure of the torsion spring [K].

6.6.2 Toner Supply Mechanism







Inside the toner supply unit there are the agitator [A], transport screw [B] and toner supply roller [C]. As the grooves [D] in the toner supply roller turn past the slit [E], toner falls into the development unit [F]. The slit is made up of 21 openings each 0.6 mm in diameter. The agitator has openings [G] inside its fins to achieve a higher degree of mixing.

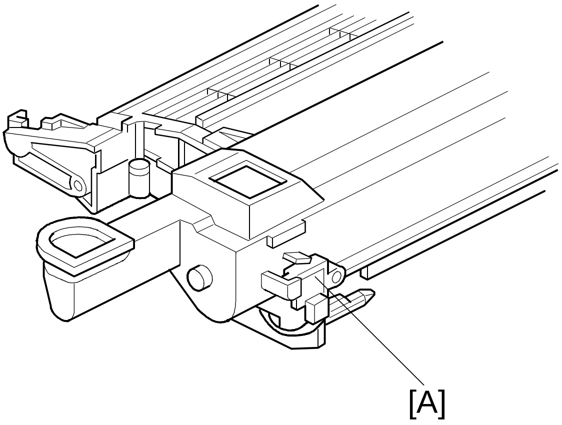
Two openings can be found in this toner supply unit to supply toner. One [H] is for **new** toner from the toner bottle, and the other [I] is for used toner from the toner recycling system.

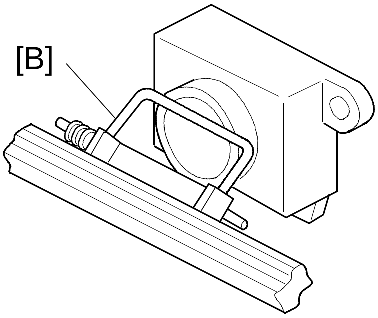
The toner supply clutch transfers rotation from the main motor to the agitator gear, which drives the toner supply roller. Both toners are mixed together and transported from the front to the rear; under ideal conditions, the proportions of the two types of toner will be about 80% new toner to 20% recycled toner.

For more details on toner recycling, see the Toner Recycling section.

For more details on toner supply control, see the Process Control Section.

6.6.3 Toner End Detection





The toner end sensor (which is a piezoelectric sensor) [A] detects whether there is sufficient toner in the toner supply unit or not.

When there is not much toner inside the toner supply unit, the pressure of toner on the toner end sensor becomes low and the sensor outputs a low signal (0V); this is the low toner condition. When this condition is detected five times, the toner bottle is turned for 2 seconds to add toner.

While the toner bottle is being turned to add toner, the CPU counts the total toner supply clutch on time since the low toner condition was first detected. If the toner end sensor is still outputting a low signal when the total clutch on time reaches one minute, the Add Toner indicator starts blinking, and the machine enters the toner near-end condition.

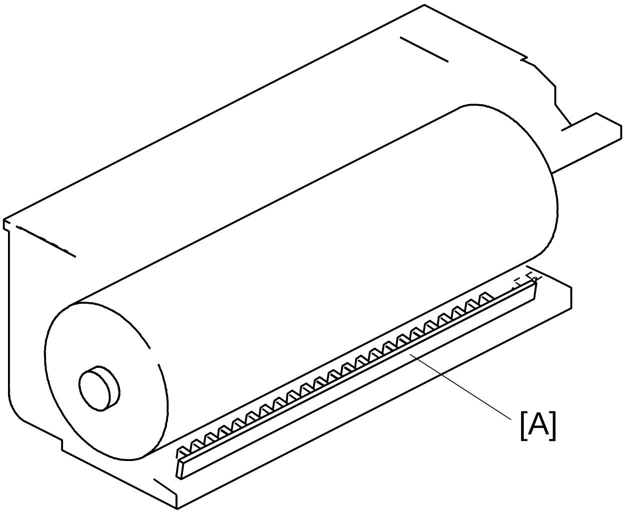
Fifty copies are allowed after entering the toner near-end condition. After this, the machine enters the toner end condition and copying is disabled.

When the main switch is turned off and on, or the front door is opened and closed, the machine drives the toner supply mechanism and monitors the toner end sensor output. (The toner supply mechanism will be driven for a maximum of 10 seconds.) If the toner end sensor outputs a high signal (5V), the toner end condition is canceled.

The toner end sensor surface is cleaned by the movement of the spring [B] attached to the agitator shaft.

7. IMAGE TRANSFER AND PAPER SEPARATION

7.1 PRE-TRANSFER LAMP

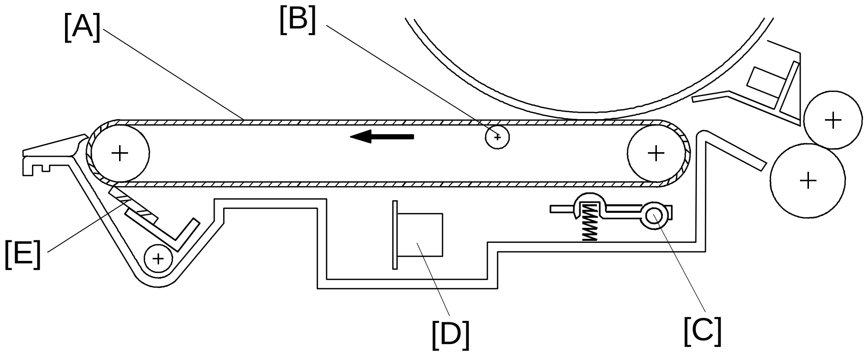


The pre-transfer lamp [A] prevents incomplete toner transfer. This lamp consists of a line of 40 LEDs.

After the latent image is developed but before the image is transferred to the copy paper, the drum surface is illuminated by the pre-transfer lamp. This illumination further reduces the negative potential on the drum surface after it has been partially discharged by exposure. This makes image transfer easier.

The pre-transfer lamp turns on and off at the same time as the main motor.

7.2 IMAGE TRANSFER AND PAPER SEPARATION



This model uses a transfer belt unit instead of a transfer and separation corona unit. The transfer belt unit consists of the following parts:

[A] Transfer belt
A belt (length: 334 mm for A153, A155, and A156 copiers; 244.5 mm for A157, A159, and A160 copiers) with high electrical resistance which holds a high negative electrical potential and attracts the toner from the OPC drum onto the paper. Also the electrical potential attracts the paper itself and helps to separate the paper from the OPC drum.

[B] Transfer bias roller
Applies transfer voltage to the transfer belt.

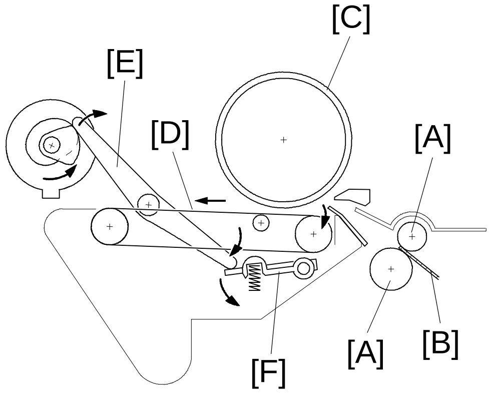
[C] Transfer belt lift lever (driven by a one-third turn clutch)
Lifts the transfer belt into contact with the OPC drum.

[D] Transfer high voltage supply board
Generates a constant transfer current.

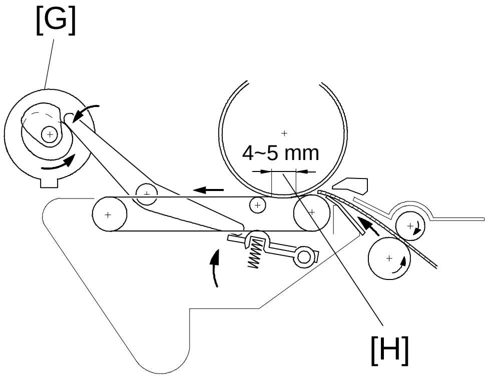
[E] Transfer belt cleaning blade
Removes toner from the transfer belt to prevent the back side of the paper from being stained.

7.3 IMAGE TRANSFER AND PAPER SEPARATION MECHANISM

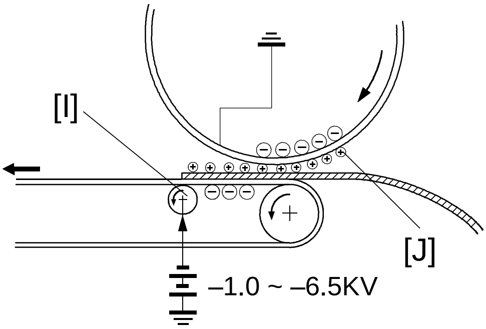
(1) The registration rollers [A] start feeding the paper [B] to the gap between the OPC drum [C] and the transfer belt [D] at the proper time. The transfer belt does not contact the OPC drum at this moment (the on-off lever [E] pushes down the transfer belt lift lever [F]).



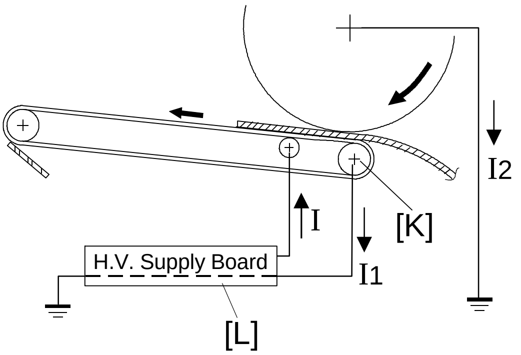
(2) Before the leading edge of the paper reaches the gap between the transfer belt and the OPC drum, the transfer belt contact clutch [G] rotates one third of a complete rotation to release the on-off lever. Then, the transfer belt lift lever pushes up the transfer belt as a result of spring pressure. The contact width [H] is about 4 ~ 5 mm.



(3) Then a negative potential of –1.0 ~ –6.5 kilovolts is applied to the transfer bias roller [I]. The negative charge attracts the positively charged toner [J] from the OPC drum. It also attracts the paper and separates the paper from the OPC drum.

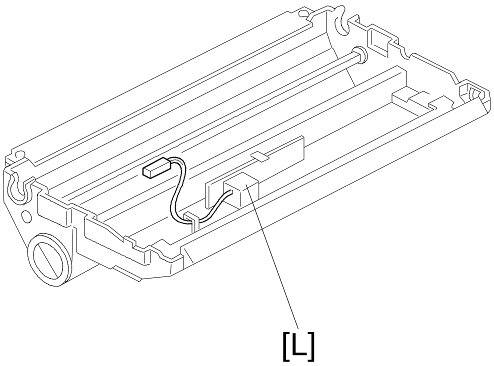


(4) After the image transfer is completed, the charge on the transfer belt holds the paper on the transfer belt. Excess charge on the paper and the transfer belt is discharged during rotation via the grounded idle roller [K].

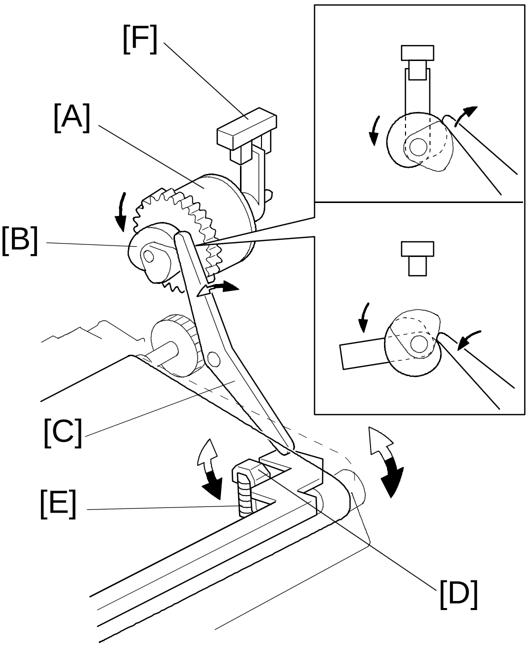


$I_2 = I - I_1$ = constant

When the transfer high voltage supply board [L] inside the transfer belt unit provides high voltage to the transfer bias roller, a small current (I_2) flows to ground via the transfer belt, the paper, and the OPC drum. It is important that this current stays constant even if the paper, environmental conditions, or the transfer belt surface resistance change. The positive feedback of I_1 to the power supply board causes the voltage to increase and decrease with I_1 so that (I_2) remains constant. (The relationship is $I_2 = I - I_1$.)



7.4 TRANSFER BELT UNIT LIFT MECHANISM



The transfer belt is away from the OPC drum.

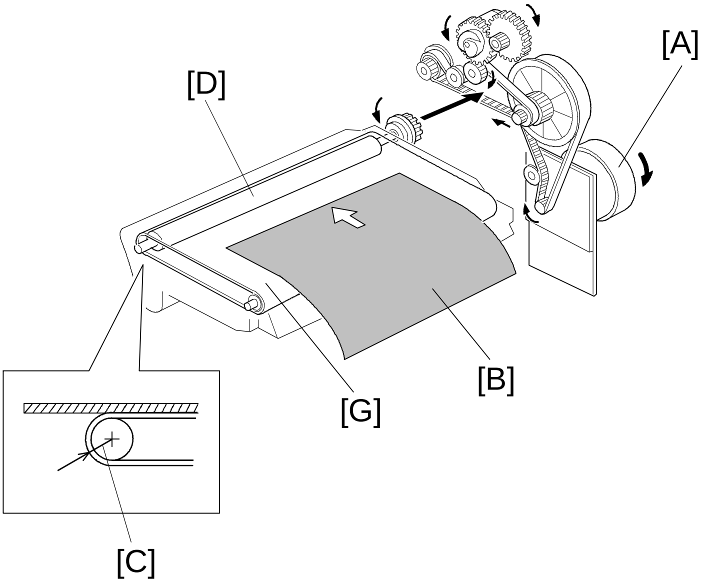
The transfer belt is in contact with the OPC drum.

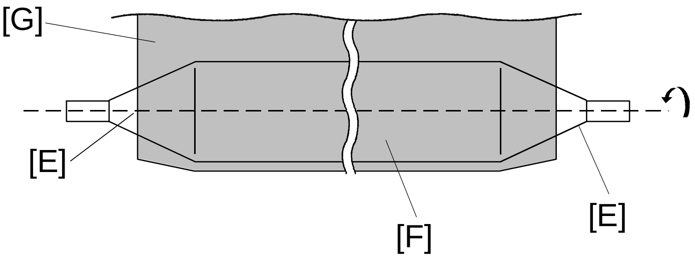
The transfer belt contact clutch [A] (a one-third turn clutch) located on the back of the copier turns on and the cam [B] rotates one third of a complete rotation. The on-off lever [C], riding on the cam, rotates counterclockwise to release the transfer lift lever [D]. Then, the springs [E] push up the transfer belt lift lever and the transfer belt to make the transfer belt contact the OPC drum.

The transfer belt contact home position sensor [F] is used to detect the home position of the cam (this is when the transfer belt is away from the OPC drum). The transfer belt must be released from the OPC drum while it is not being used for image transfer. The reasons are as follows:

- To prevent V_{SP}, V_L, and V_R patterns on the OPC drum from being rubbed off by the transfer belt, because the transfer belt is located between the development unit and the ID sensor.
- To prevent a change in the OPC drum characteristics because of the influence of additives inside the rubber belt.

7.5 PAPER TRANSPORTATION AND BELT DRIVE MECHANISM



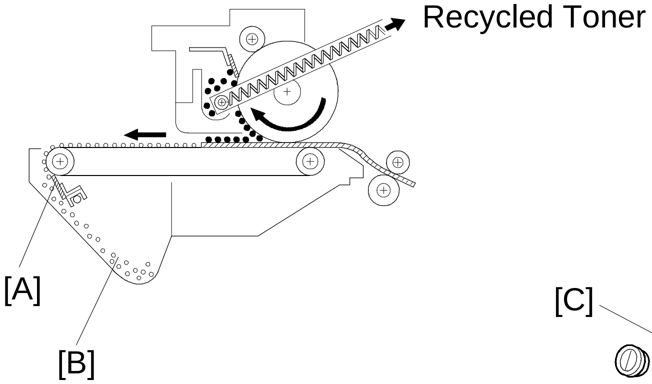


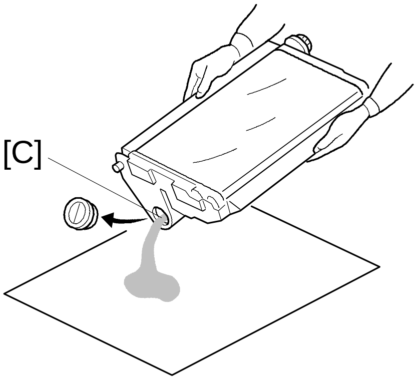
The main motor [A] drives the transfer belt through some timing belts and gears. Since the transfer belt electrically attracts the paper [B], a transport fan is not required.

As a result of its own stiffness and the curvature [C] of the belt, the paper separates from the transfer belt above the transfer belt drive roller [D] as the belt turns sharply around the transfer belt drive roller.

The tapered parts [E] at both sides of the drive roller [F] help keep the transfer belt [G] at the center position.

7.6 TRANSFER BELT CLEANING MECHANISM





Some toner may adhere to the transfer belt under the following conditions:

- When a paper jam occurs.
- When the by-pass feed table side fences are set wider than the actual paper width. In this condition, the erase lamp does not erase the area of the drum outside the width of the copy paper. The image developed on this area will not be transferred to the copy paper but to the transfer belt.
- When the platen cover or ADF is opened during the first copy when using by-pass feed. In this condition, the scanner scans full size and a full black image is developed outside the length of the copy paper. The developed image on this area will not be transferred to the copy paper but to the transfer belt instead.

The adhering toner must be removed to prevent the back side of later copies from being stained. The cleaning blade [A], which is always in contact with the transfer belt, scrapes off any toner remaining on the transfer belt. Paper dust on the transfer belt is also scraped off, and is disposed of with the waste toner from the transfer belt. A counter blade system is used to clean the transfer belt. The surface of the transfer belt is coated to make it smooth and to prevent the cleaning blade from being flipped by the transfer belt.

The toner that is scraped off falls into the toner collection tank [B]. Collected toner must be discarded from the opening [C] at each preventive maintenance call. This toner must not be recycled, because it contains paper dust.

During the following modes, the transfer belt unit is away from the drum while the transfer belt is rotated.

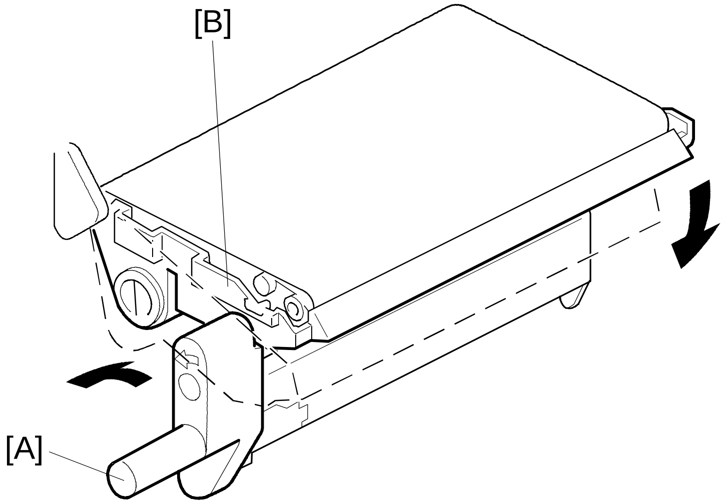
- 1,000 copies process control
- Stacking paper in the duplex unit
- Drum charge roller cleaning
- Fusing idling
- Toner end recovery

The transfer belt cleaning blade scrapes off any toner remaining on the transfer belt, but some toner will be stuck in very small cracks in the transfer belt (these small cracks are a normal characteristic of the transfer belt).

If there is some negative toner in these cracks, there may be some side effects, such as the back sides of copies getting dirty. This is because the negative transfer voltage repels the negatively-charged toner, and this toner becomes attracted to the back of the copy paper.

After any of the above-stated five modes, to prevent these side effects, the transfer belt comes into contact with the drum and rotates for 2 seconds while applying the transfer bias voltage (–1.0 ~ –6.5 kV). As a result of this negative charge, the negatively-charged toner is repelled and is attracted to the drum. This toner is then scraped off by the drum cleaning blade.

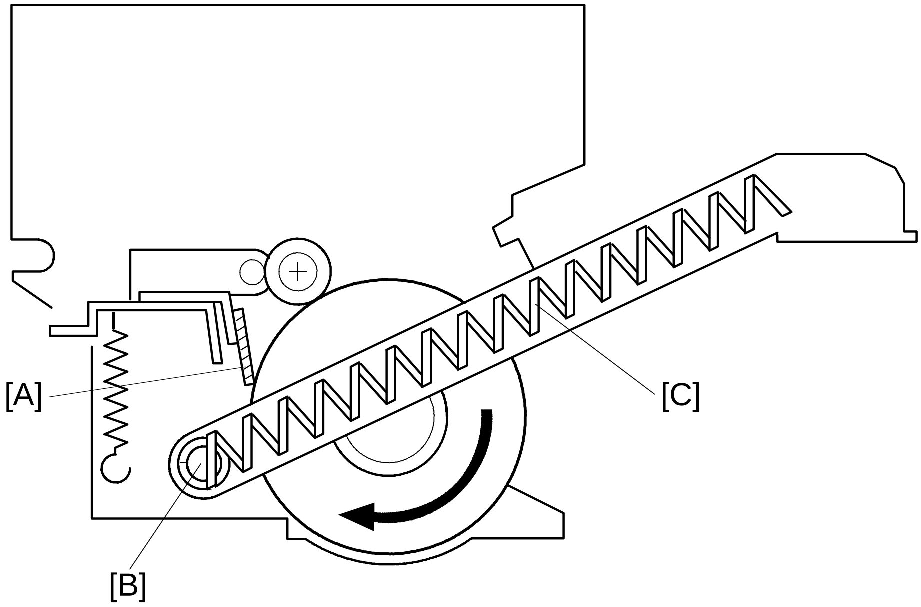
7.7 TRANSFER BELT UNIT RELEASE MECHANISM

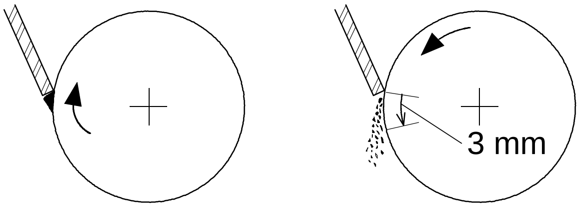


When the transfer belt unit release lever "A1" [A] is rotated counterclockwise, the transfer belt unit [B] is released, allowing it to rotate down clockwise. This mechanism allows easy paper jam recovery and easy maintenance of the transfer belt unit.

8. DRUM CLEANING

8.1 OVERVIEW



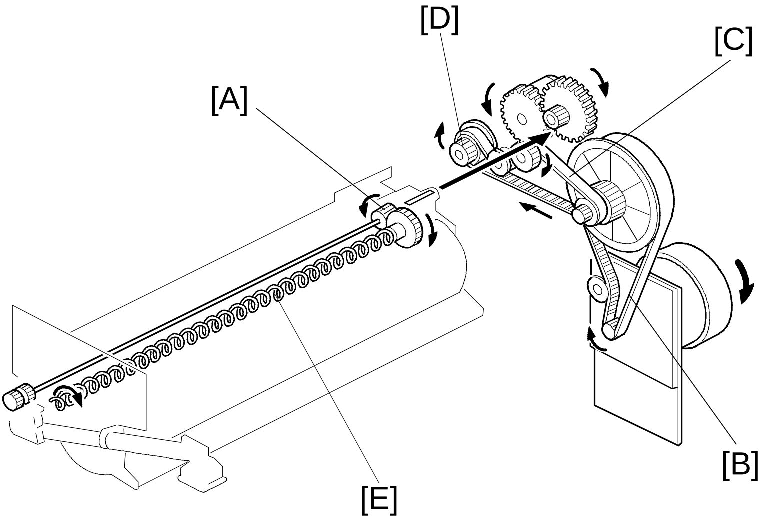


This copier uses a counter blade system for drum cleaning. In a counter blade system, the blade [A] is angled against drum rotation. This system has the advantage of high cleaning efficiency.

The toner remaining on the drum is scraped off by the cleaning blade and it falls onto the toner collection coil [B]. Collected toner is transported to the recycled toner transport coil [C].

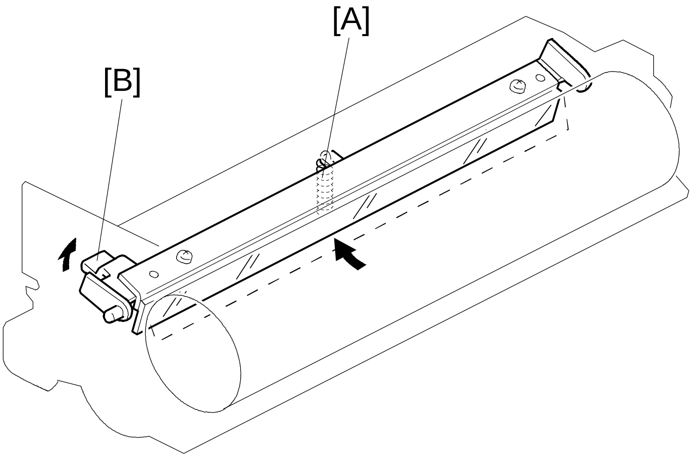
To remove the toner that is accumulated at the edge of the cleaning blade, the drum turns in reverse for about 3 mm at the end of every copying job.

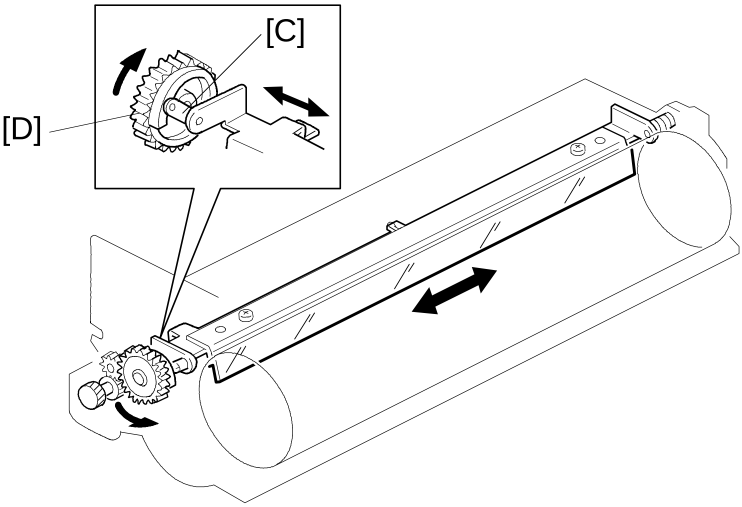
8.2 DRIVE MECHANISM



Drive from the main motor is transmitted to the cleaning unit drive gear [A] by the timing belts [B] and [C] and the joint gear [D]. The cleaning unit drive gear [A] then transmits the drive to the toner collection coil [E]. The two gears at the front end of the cleaning unit drive gear shaft are used to move the cleaning blade from side to side and to drive the recycled toner transport coil.

8.3 CLEANING BLADE PRESSURE MECHANISM AND SIDE-TO-SIDE MOVEMENT

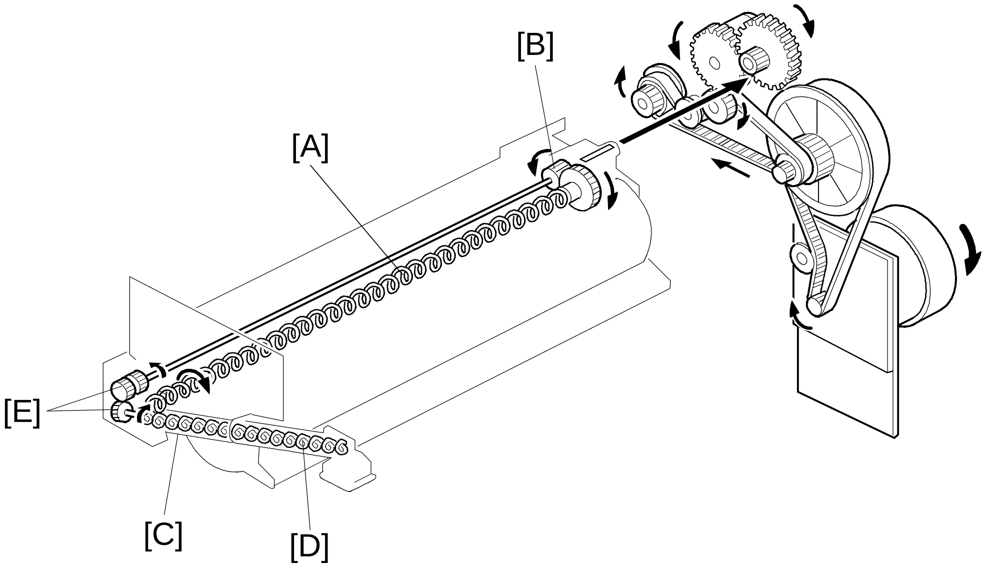




The spring [A] always pushes the cleaning blade against the OPC drum. The cleaning blade pressure can be manually released by pushing up the release lever [B]. To prevent cleaning blade deformation during transportation, the release lever is locked in the pressure release (upper) position.

The pin [C] at the front end of the cleaning blade holder touches the inner rim of the sinusoidal cam gear [D] which gives a side-to-side movement to the blade. This movement helps to disperse accumulated toner to prevent early blade edge deterioration.

8.4 TONER COLLECTION MECHANISM

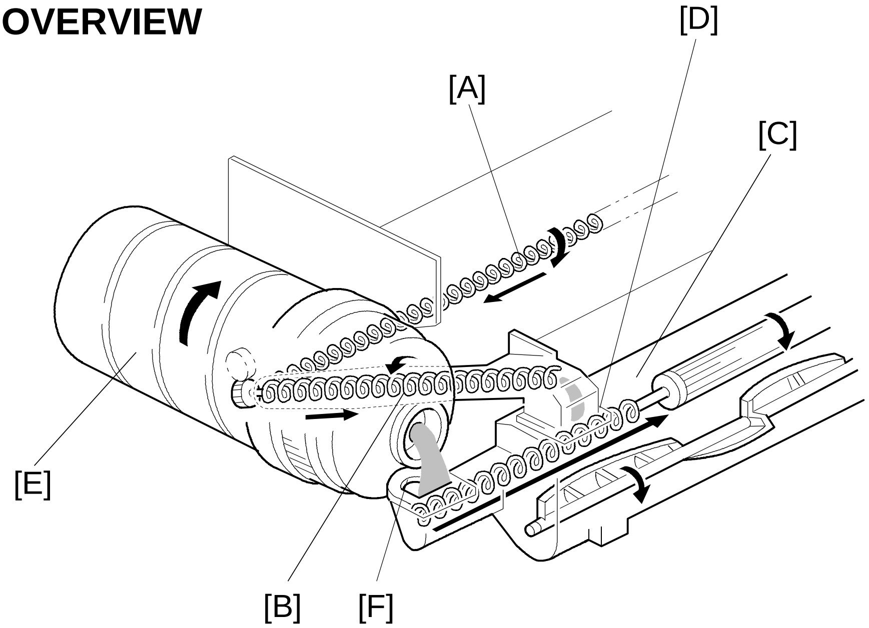


Toner scraped off by the cleaning blade falls onto the toner collection coil [A]. The toner collection coil is driven by the main motor via the cleaning unit drive gear [B].

The toner collection coil transports toner to where it joins the recycled toner transport tube [C] at the front of the drum unit. The recycled toner transport coil [D] is driven by two helical gears [E], one of which is on the front end of the cleaning unit drive gear shaft and the other on the shaft of the recycled toner transport coil. The recycled toner transport coil moves collected toner to the toner supply unit for recycling. (See the "Toner Recycling" section for details.)

9. TONER RECYCLING

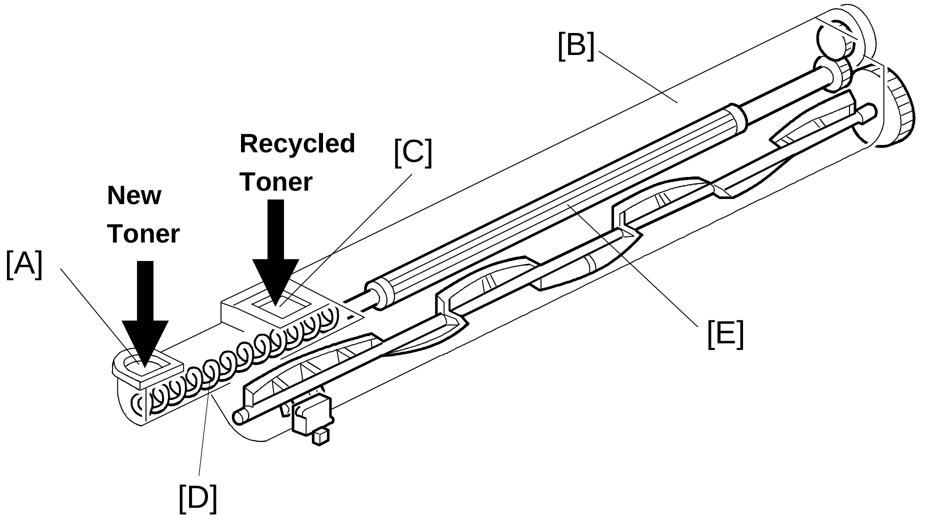
9.1 OVERVIEW



As described in the "Drum Cleaning" section, the toner remaining on the drum which was not transferred to the copy paper is scraped off by the cleaning blade and falls onto the toner collection coil [A].

The toner collection coil carries the toner to the recycled toner transport coil [B]. This helical coil transports the collected recycled toner to the toner supply unit [C] through the opening [D]. In addition, new toner is supplied from the toner bottle [E] into the toner supply unit through the opening [F]. (Refer to the "Toner Bottle Replenishment Mechanism" section.)

9.2 NEW TONER AND RECYCLED TONER MIXTURE



The mixture ratio of new toner and recycled toner affects copy quality.

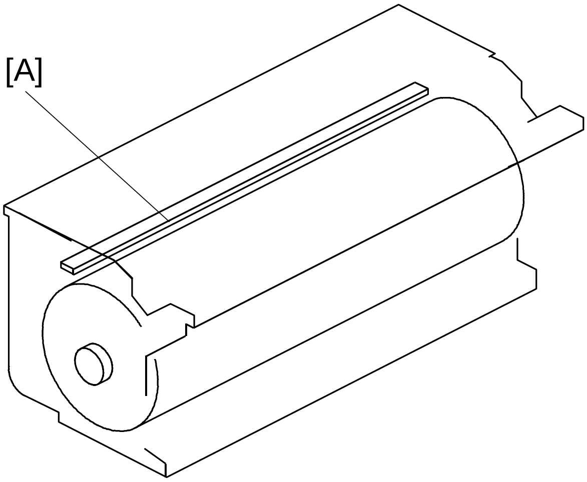
New toner is supplied from the toner bottle to the opening [A] in the toner supply unit [B] when the toner bottle drive motor rotates.

Recycled toner is transported to the opening [C] when the toner collection coil in the cleaning unit and the recycled toner transport coil in the drum unit are driven by the main motor. However, the new toner and the recycled toner stop at the openings [A] and [C] until the transport coil [D] rotates. So the new and recycled toner are only transported into the toner supply unit when the transport coil is driven through the toner supply roller [E]; this occurs when the toner supply clutch turns on while the main motor is running. Therefore, recycled toner and new toner are supplied together to the interior of the toner supply unit.

The transfer ratio of the toner on the OPC drum to the copy paper is about 80%, regardless of the proportion of black in the image. So 20% of the toner always goes to the recycled toner inlet of the toner supply unit. When the toner end sensor indicates that more toner is needed, the toner supply clutch turns on, and this recycled toner goes into the development unit with new toner (about 80% of the mixture will be new toner).

As toner is supplied to the machine on successive occasions, the proportion of recycled toner in the development unit will approach 20% over time, until the developer is changed and the process starts again with all the toner in the development unit being new toner.

10. QUENCHING



In preparation for the next copy cycle, light from the quenching lamp [A] neutralizes any charge remaining on the drum.

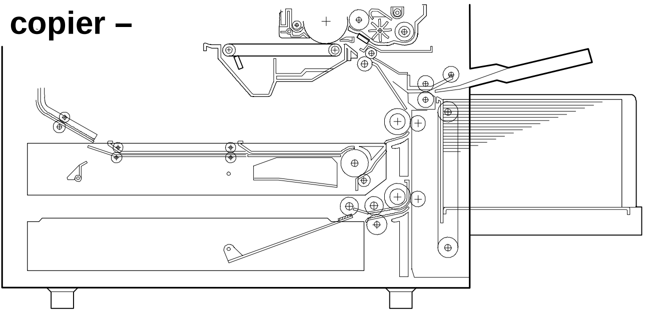
The quenching lamp consists of a line of nine LEDs extending across the full width of the drum.

Red LEDs are used to reduce ultra violet light which would cause light fatigue of the OPC drum.

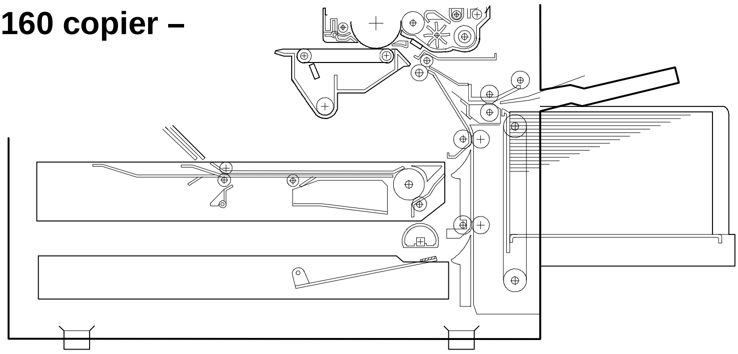
11. PAPER FEED AND REGISTRATION

11.1 OVERVIEW

– A156 copier –



– A160 copier –



This model has three paper feed stations: the large capacity tray feed station (LCT machines only), the upper paper tray feed station (non-duplex machines only) and the lower paper tray feed station.

The LCT holds 1000 sheets of paper. The upper and lower paper trays are drawer trays that hold either 500 sheets of paper (A153/A155/A156 copiers) or 250 sheets of paper (A157/A159/A160 copiers).

Paper can also be fed using the by-pass feed table, which uses the feed mechanism of the LCT feed station. The by-pass feed table can hold 40 sheets of paper.

There are two types of paper feed system: the FRR feed system and the corner separation system.

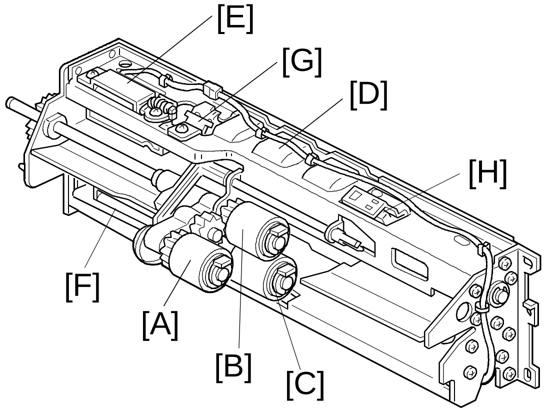
- The FRR feed system is used for the A153/A155/A156 copiers, the LCT and the by-pass feed station.
- The corner separation system is used for the A157/A159/A160 copiers.

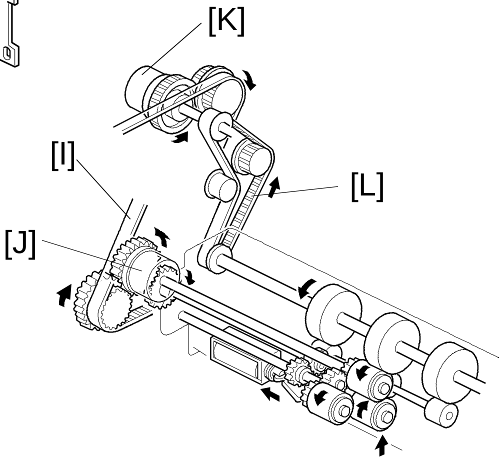
The top sheet of paper separates from the stack and is fed to the relay rollers, then to the registration rollers.

There are two relay sensors, one located just under each set of relay rollers. These sensors are used for paper jam detection.

11.2 PAPER FEED MECHANISM [A153/A155/A156]

11.2.1 Drive Mechanism



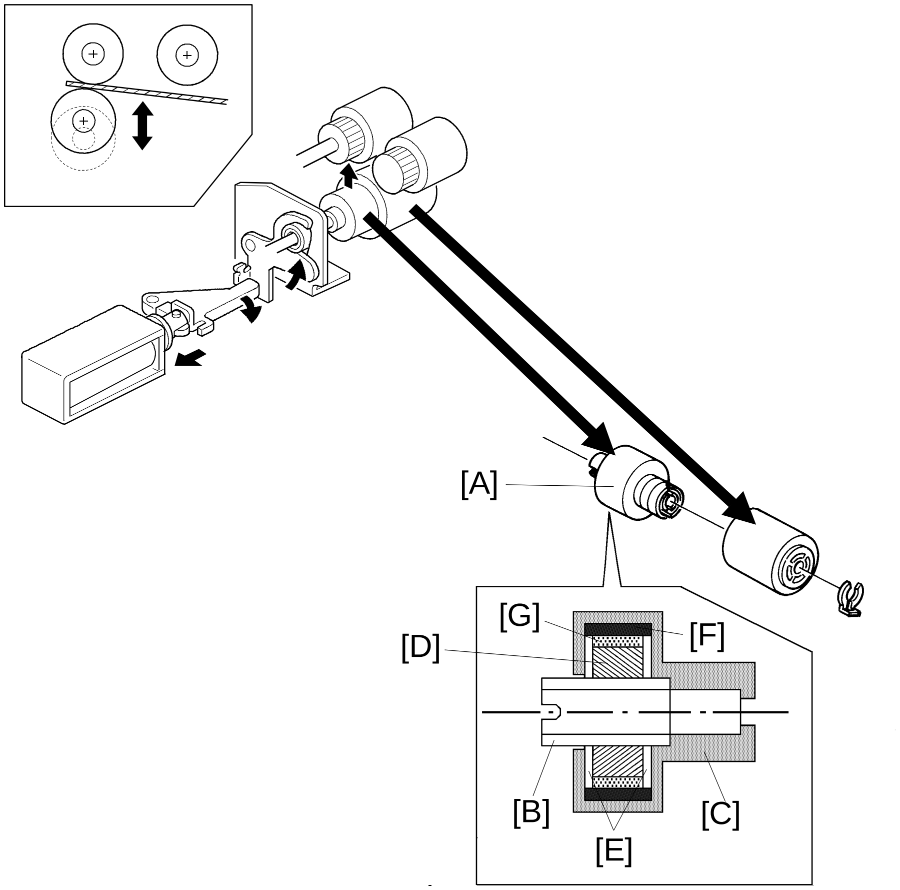


Each paper feed unit consists of a pick-up roller [A], feed roller [B], separation roller [C], relay roller [D], pick-up solenoid [E], separation solenoid [F], paper upper limit sensor [G], and paper end sensor [H].

The pick-up, feed and separation rollers are driven by the main motor via the timing belt [I] and the paper feed clutch [J]. The relay roller is also driven by the main motor. However, drive is transmitted to the relay roller via the relay clutch [K] and the timing belt [L].

In standby mode, the separation roller is away from the feed roller.
At 50 ms after the Start key was pressed, the main motor and the separation roller solenoid of the selected paper feed station turn on. Then the separation roller contacts the feed roller.
At 100 ms after the main motor started to rotate, the pick-up solenoid turns on. The pick-up roller lowers to make contact with the top of the paper stack. The pick-up solenoid stays on for 314 ms.
At 200 ms after the main motor started to rotate, the paper feed clutch and the relay clutch turn on. The feed roller and relay rollers feed the top sheet of the paper stack to the registration rollers. When the leading edge of the paper passes through the upper relay sensor, the paper feed clutch is de-energized.

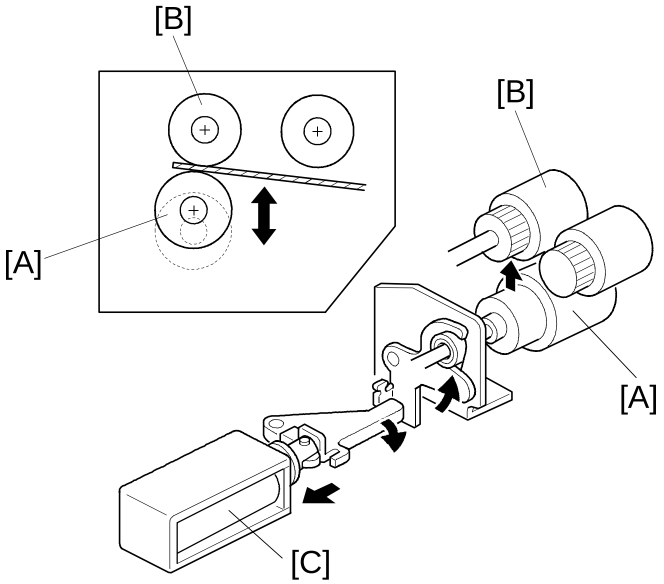
11.2.2 Slip Clutch Mechanism



The separation roller is mounted on a slip clutch. The slip clutch [A] consists of an input hub [B] and an output hub [C], which also acts as the case of the clutch. A magnetic ring [D] and the steel spacers [E] are fitted onto the input hub. A ferrite ring [F] is fitted into the output hub. Ferrite powder [G] packed between the magnetic ring and the ferrite ring generates a constant torque due to magnetic force. The input hub and the output hub slip when the rotational force exceeds the constant torque. The constant torque prevents double feeding, because it exceeds the coefficient of friction between sheets of paper.

This type of slip clutch does not require lubrication.

11.2.3 Separation Roller Release Mechanism

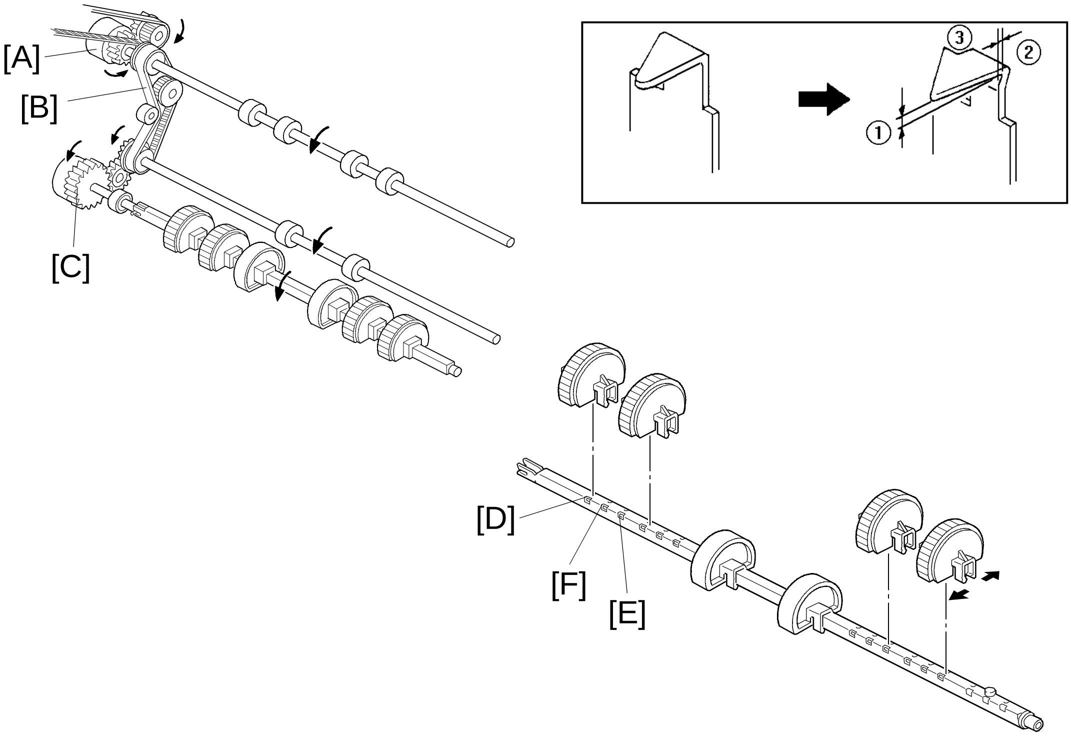


This FRR mechanism uses a separation roller release system. The separation roller [A] is normally away from the feed roller [B]. When the paper feed station has been selected and the Start key is pressed, the separation solenoid [C] moves the separation roller into contact with the feed roller.

This mechanism has the following three advantages:

- If the separation roller is normally away from the feed roller, it reduces the wear on the rubber surface of the separation roller that is caused by friction between the feed roller and the separation roller.
- After paper feeding is completed, a sheet of paper sometimes remains between the feed roller and the separation roller. If the feed tray is drawn out in this condition, it is possible for this sheet of paper to be torn. When the separation roller is away from the feed roller, the remaining sheet of paper is released from between the feed roller and the separation roller.
- When paper misfeeds occur in this area, users can easily pull out paper jammed between the feed roller and the separation roller because the separation roller is away from the feed roller.

11.3 PAPER FEED DRIVE MECHANISM [A157/A159/A160]



The main motor drives the paper feed rollers through the relay clutch gear [A], the timing belt [B] and the paper feed clutch gear [C].

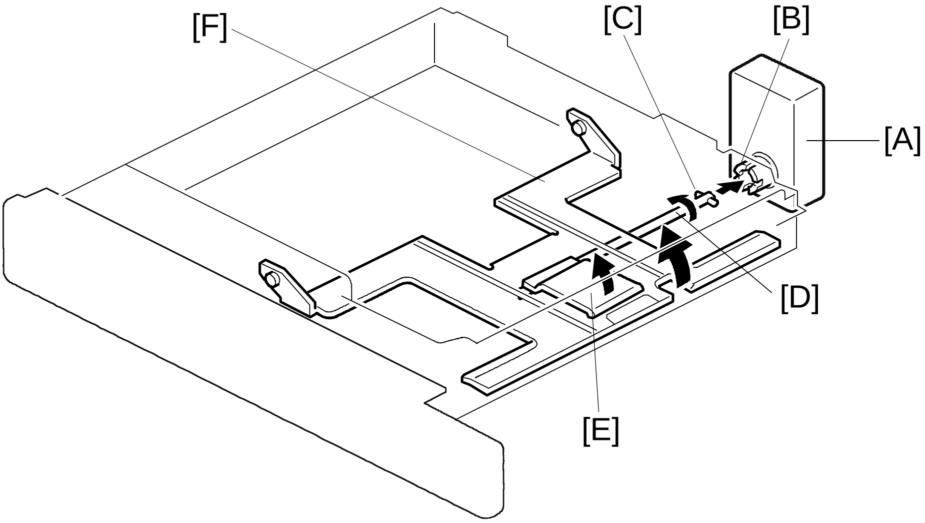
After the Start key is pressed, the paper feed clutch turns on and the paper feed rollers start rotating to feed the paper. The paper feed clutch stays on for 150 ms to turn the paper feed rollers once only (the paper feed clutch is a one-turn clutch).

This paper feed mechanism uses the corner separation system. The shape of the corner separators has been changed as shown above. These corner separators have the following advantages.

- Dog ear problems were reduced by the changes in angles ① and ② .
- Multiple paper feeding was reduced by the change in shape at ③ .

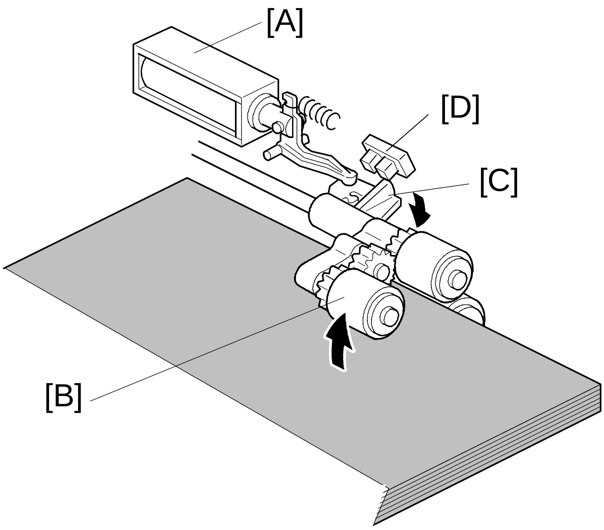
There are two extra holes for each paper feed roller on the paper feed roller shaft for use when multiple feed or paper jams occur. The factory-set position of the paper feed roller is hole [D], which is most suitable for A4, LT and B size paper. Another [E] is especially suitable for B size paper. The other, [F], is a general position that is used in Japan, where people are as likely to use B size paper as A size. If paper jams or non-feed errors occur for users who mainly use B size paper, change the paper feed roller position to [E]

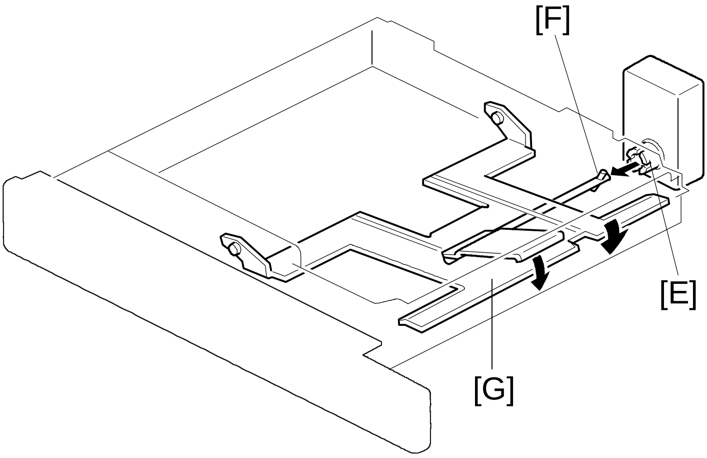
11.4 PAPER LIFT MECHANISM



- A153/A155/A156 copiers -

The tray switch detects when the tray is placed in the machine. When the machine detects that the paper tray is in the machine, the tray lift motor [A] rotates and the coupling gear [B] on the tray lift motor engages the pin [C] of the lift arm shaft [D]. Then the tray lift arm [E] lifts the tray bottom plate [F].

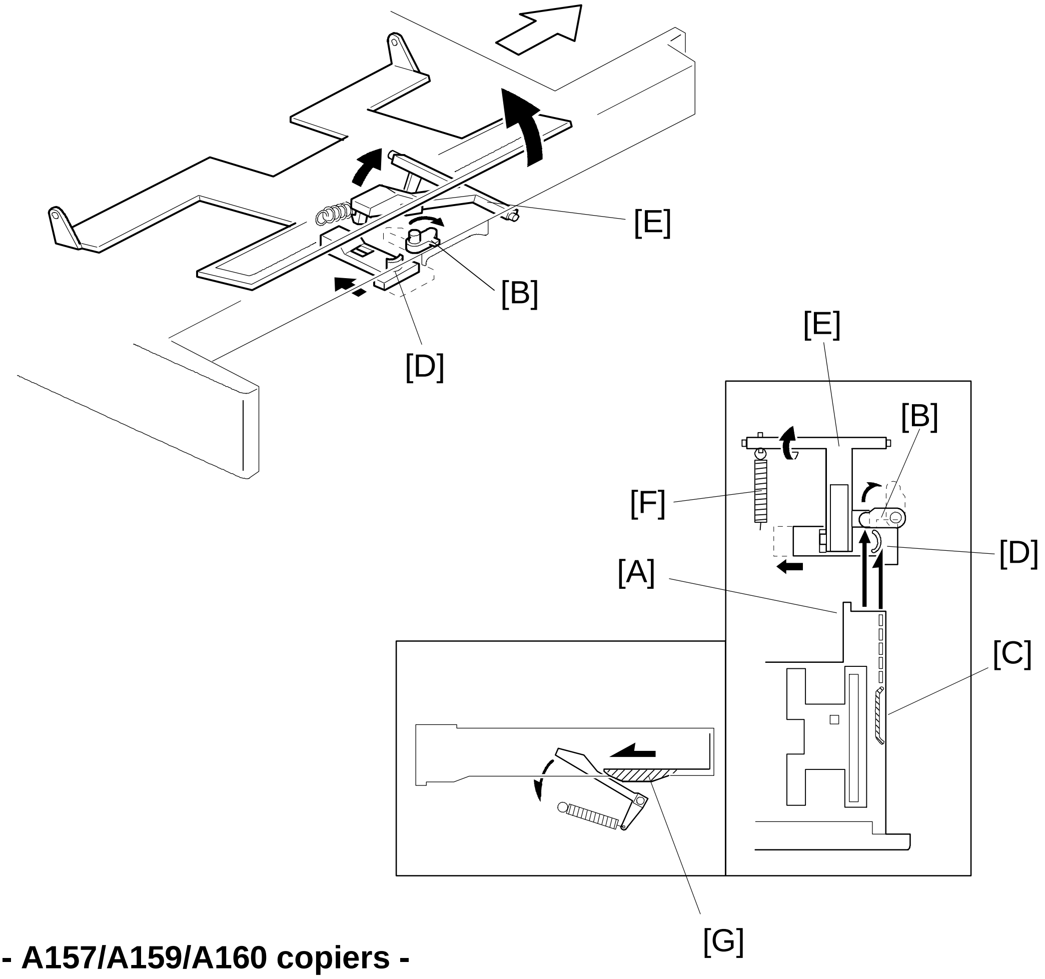




When the tray lift motor turns on, the pick-up solenoid [A] activates to lower the pick-up roller [B]. When the top sheet of paper reaches the proper height for paper feed, the paper pushes up the pick-up roller and the actuator [C] on the pick-up roller supporter activates the paper upper limit sensor [D] to stop the tray lift motor.

After several paper feed cycles, the paper level gradually lowers and the upper limit sensor is de-activated. The tray lift motor turns on again until this sensor is activated again.

When the tray is drawn out of the machine, the tray lift motor coupling gear [E] disengages the pin [F] of the lift arm shaft, and the tray bottom plate [G] then drops under its own weight.



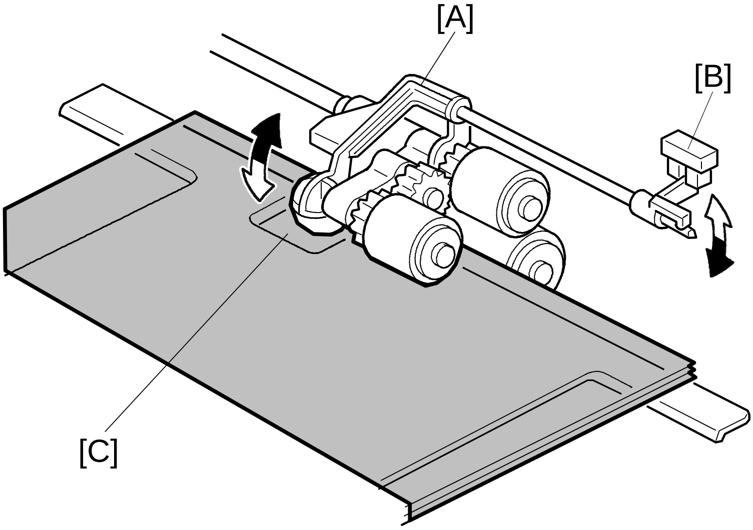
- A157/A159/A160 copiers -

When the paper tray is closed, the projection [A] on the tray pushes the release lever [B], and the other projection [C] pushes the release slider [D]. Then the release slider comes off the bottom plate lift arm [E].

Once the release slider comes off, the spring [F] raises the bottom plate lift arm and the bottom plate is lifted up. Then the top sheet of paper pushes up the corner separators. This keeps the stack of paper at the correct height.

When the tray is pulled out, the bottom part [G] of the tray pushes the bottom plate lift arm into the release slider.

11.5 PAPER END DETECTION

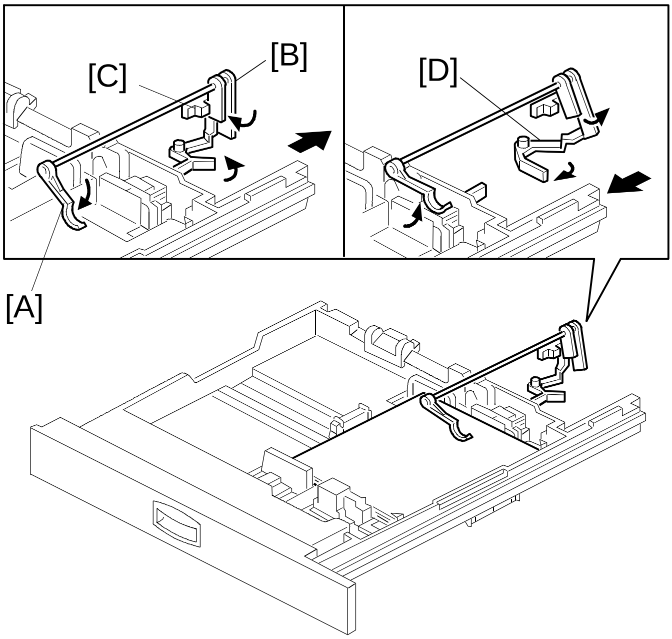


- A153/A155/A156 copiers -

If there is some paper in the paper tray, the paper end feeler [A] is raised by the paper stack and paper end sensor [B] is deactivated.

When the paper tray runs out of paper, the paper end feeler drops into the cutout [C] in the tray bottom plate and the paper end sensor is activated.

When a paper end condition occurs, the tray lift motor lowers the paper bottom plate and the pick-up solenoid turns off.

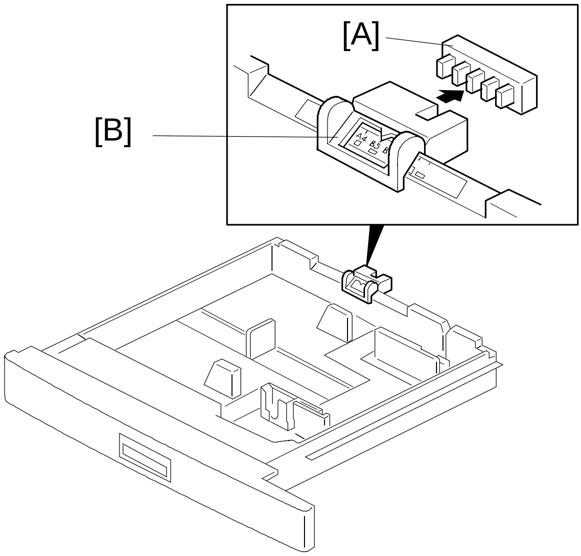


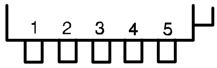
- A157/A159/A160 copiers -

The paper end feeler [A] is on the same shaft as the paper end actuator [B]. When the tray runs out of paper, the paper end feeler drops into the cutout in the tray bottom plate and the paper end actuator activates the paper end sensor [C].

The paper end actuator is in contact with the lever [D]. When the paper tray is drawn out of the copier, the lever turns as shown by the arrow in the diagram, and pushes up the actuator. As a result, the feeler rotates upwards. This mechanism is necessary to prevent the feeler from getting damaged by the paper tray body.

11.6 PAPER SIZE DETECTION

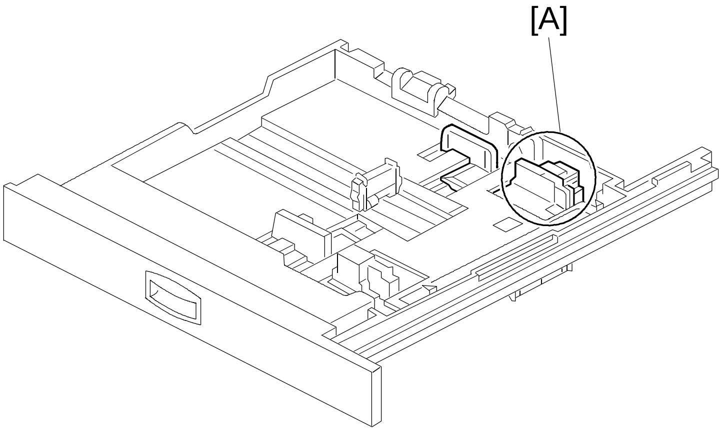


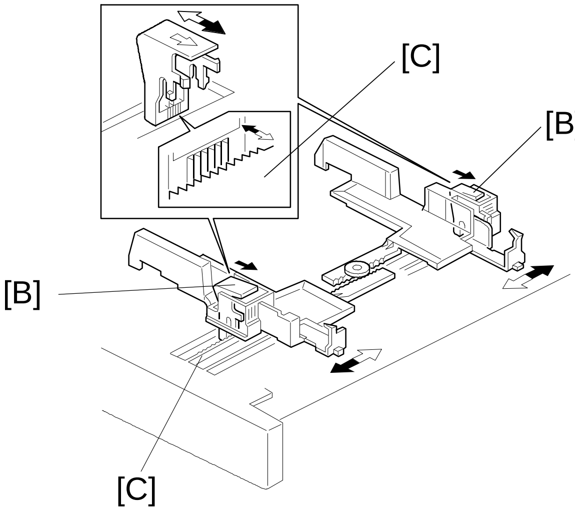
Actuated = 0 Deactuated = 1 	**Paper size**	**L: Lengthwise** **S: Sideways**
	A4/A3 Version	**LT/DLT Version**
01111	A3-L	11" x 17"
00111	B4-L	8½" x 14"
10011	A4-L	8½" x 11"
01001	A4-S	11" x 8½"
00100	B5-L	A4-L
00010	B5-S	A4-S
00001	A5-S	8½" x 5½"
10000	8½" x 11"	11" x 15"
11000	11" x 8½"	10" x 14"
11100	11" x 17"	8½" x 13"
11110	F4-L	8" x 10"

The paper size switch [A] detects the paper size. The paper size switch has five microswitches inside. The paper size sensor is actuated by an actuator plate [B] located on the rear of the tray. The actuator is slid across to match the paper size. Each paper size has its own unique combination of switch states, as shown in the table. The CPU determines the paper size by the signal combination from the sensor.

Using SP5-019, the first tray can be set up to accommodate one of a wider range of paper sizes. If this is done, the readings from the first tray's sensor are ignored. If a different size of paper is used without changing SP5-019, paper jams will result.

11.7 SIDE FENCE DOUBLE STOPPER MECHANISM [A157/A159/A160]





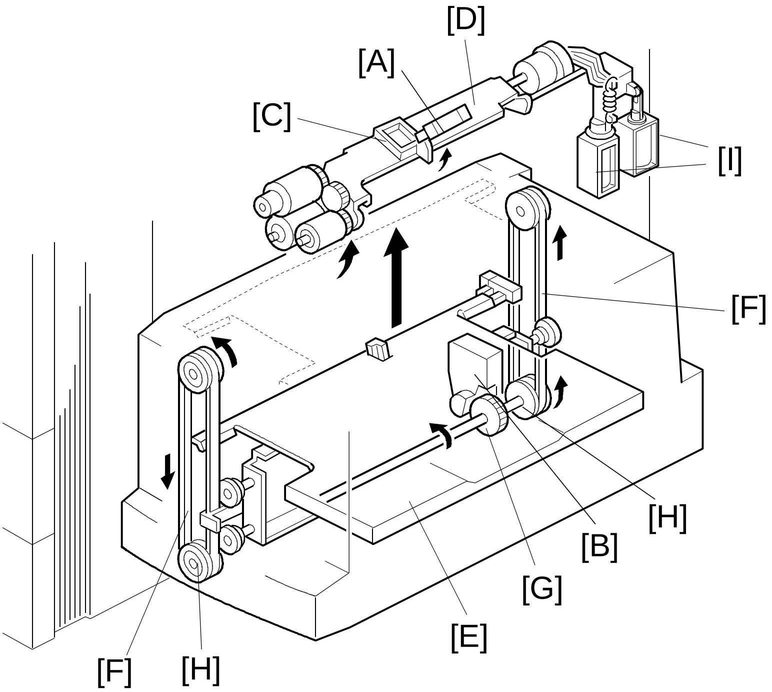
In this model, there is a side fence stopper mechanism for both the front and rear side fences.

If the tray is closed with excessive force after loading paper, paper may come over the rear side fence, because the fence is deformed by the weight of the paper leaning against it. As a result, skewing or paper jams may occur. To prevent this, a side fence stopper mechanism [A] has been added to the rear side fence also.

The release levers [B] have a stopper which contains teeth like those on a gear. The guide rails [C] also have teeth. When the release lever is pushed, the gear teeth release each other and the side fences can be moved.

11.8 LARGE CAPACITY TRAY

11.8.1 Paper Lift Mechanism



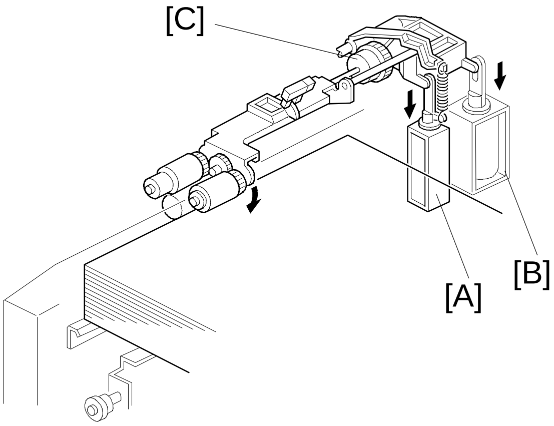
The LCT upper limit sensor [A] above the paper feed upper guide plate controls the LCT lift motor [B]. The actuator [C] for the sensor is on the pick-up roller bracket [D]. The LCT lift motor drives the LCT bottom plate [E] which is attached to the timing belts [F] through the helical gear [G], drive pulleys [H], and a timing belt.

When the LCT top cover is closed, the LCT cover switch actuates and the both pick-up solenoids [I] are energized. The pick-up roller bracket then lowers and the LCT upper limit sensor is deactivated. At this time, the LCT lift motor starts rotating and the LCT bottom plate starts lifting.

When the top sheet of the paper stack raises the pick-up roller, the LCT upper limit sensor is activated and the LCT lift motor stops. Shortly after, the pick-up solenoids turn off and the pick-up roller goes back to the up position.

During the copy cycle, the pick-up roller is lowered to prepare for feeding the next sheet of paper. When the level of the paper stack has fallen, the LCT upper limit sensor becomes deactivated and the LCT lift motor turns on to maintain the correct level for paper feed.

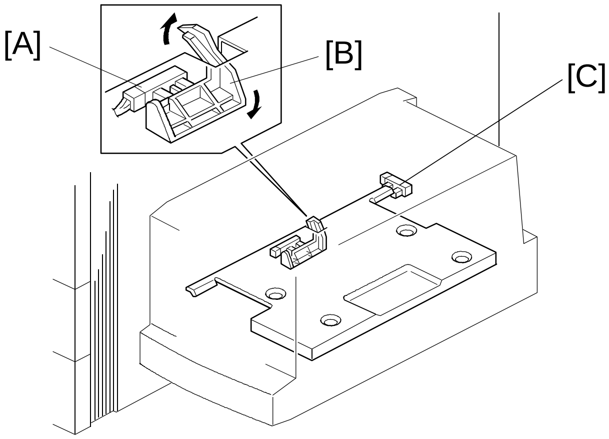
11.8.2 Paper Feed Mechanism



The LCT uses an FRR feed system. Unlike for the A153/155/156 paper trays, the feed and separation rollers are always in contact. The LCT pick-up solenoid [A], by-pass pick-up solenoid [B], and by-pass feed clutch [C] control paper feed from the LCT. When the Start key is pressed, the by-pass pick-up solenoid turns on, and stays on until the copy run has finished. At 150 ms after the Start key is pressed, the LCT pick-up solenoid turns on. Then, 100 ms after this, the by-pass feed clutch turns on to feed the top sheet of paper. Between sheets of paper, solenoid [B] turns off, but solenoid [A] stays on.

In machines without an LCT, the small solenoid [A] is missing, and the large solenoid [B] is installed in the same position as solenoid [A] above.

11.8.3 Paper End Detection

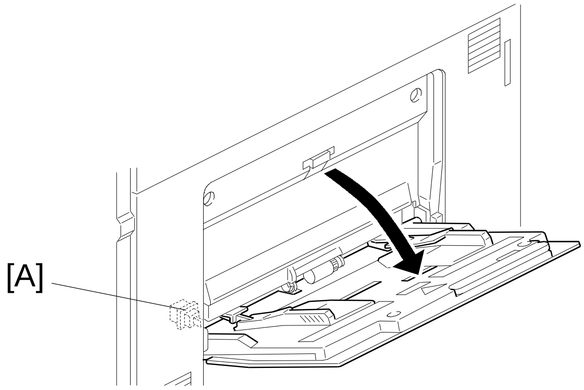


The LCT paper end sensor [A] is just under the LCT bottom plate.

When the LCT runs out of paper, the actuator [B] pivots into the LCT paper end sensor. Then the LCT lift motor starts to rotate in reverse to lower the LCT bottom plate. When the LCT lower limit sensor [C] is activated by the bottom plate, the LCT lift motor stops.

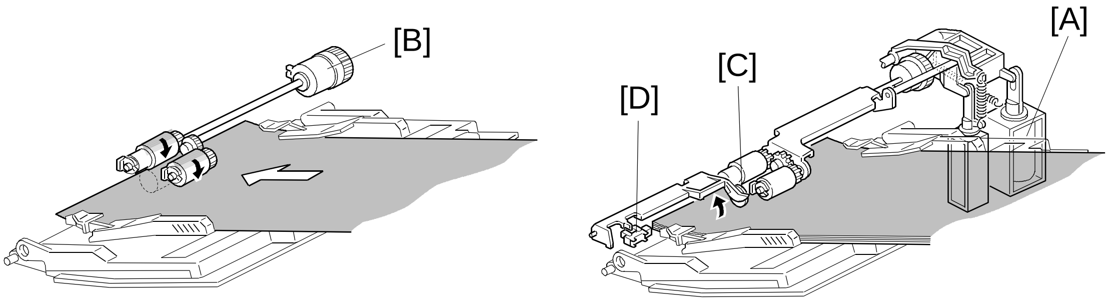
11.9 BY-PASS FEED TABLE

11.9.1 Table Open/Closed Detection



The by-pass feed table switch [A] detects when the by-pass feed table is opened. Then the CPU turns on the by-pass feed indicator on the operation panel.

11.9.2 Feed Mechanism/Paper End Detection



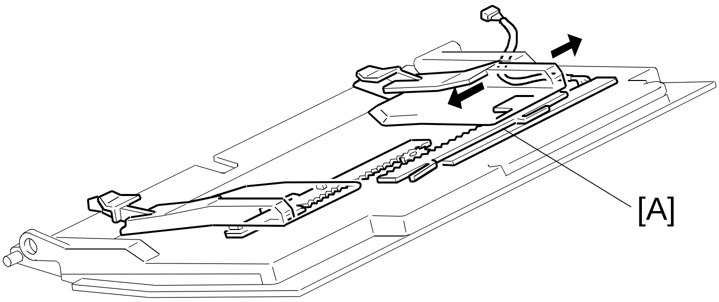
The by-pass feed table uses an FRR feed system, using the same rollers as the LCT, and one of the solenoids (solenoid [A]; also see LCT - Paper Feed Mechanism). Only one of the two solenoids in the mechanism is used, because the pick-up roller does not have to drop so far as it does when feeding from the LCT.

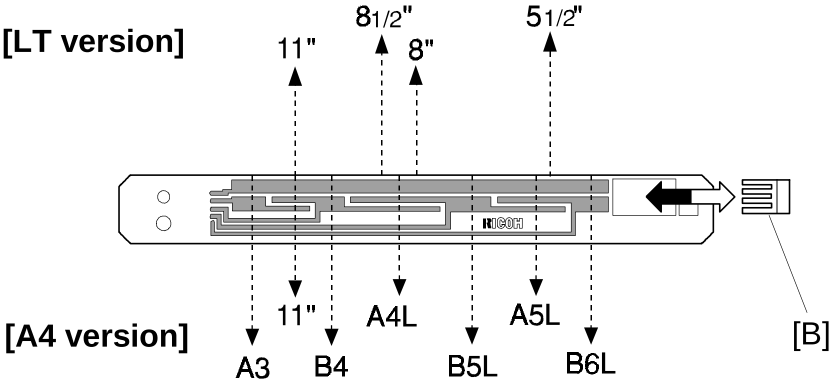
The user can put up to 40 sheets of paper on the by-pass feed table. Note that the paper can be pushed right into the machine, causing jams. The user must stop pushing the paper in when the by-pass feed indicator goes out.

When the Start key is pressed, the by-pass feed clutch [B] and the pick-up solenoid turn on to feed the top sheet of paper.

When there is no paper on the by-pass feed table, the paper end feeler [C] drops into the cutout in the lower guide plate and the by-pass feed paper end sensor [D] is deactivated.

11.9.3 By-pass Feed Paper Width Detection

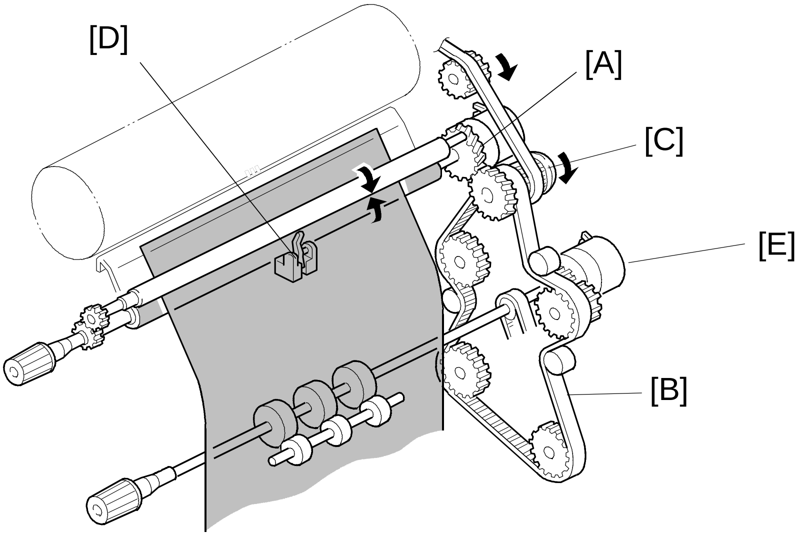




The by-pass feed paper width sensor board [A] monitors the paper width. The rear side fence is connected to the terminal plate [B]. When the side fences are positioned to match the paper width, the terminal plate slides along the wiring patterns on the detection board. The patterns for each paper width on the paper width detection board are unique. Therefore, the machine determines which paper width has been placed in the by-pass feed table by the signal output from the board.

For users with LT version models who wish to use A4 version paper sizes, or the other way round, the paper size from the by-pass feed tray can be fixed with SP5-019. The reading from the sensor will be ignored if this SP mode is used to select an exotic paper size. However, if the user attempts to use a size of paper that is different from that agreed with the technician for this setting, a paper jam will occur.

11.10 PAPER REGISTRATION



Main motor rotation is transmitted to the registration clutch [A] (located on the lower registration roller shaft) through the timing belt [B] and the relay gear [C].

The registration sensor [D] is positioned just before the registration rollers.

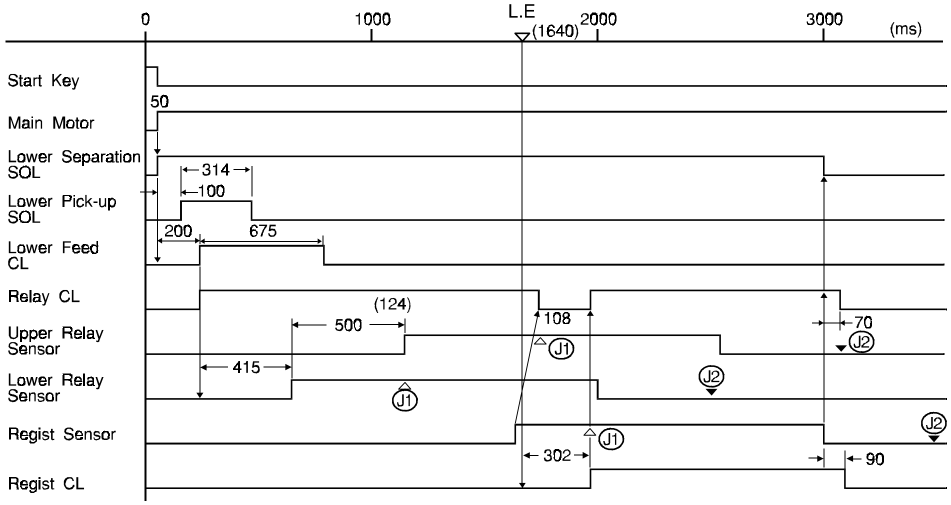
When the paper leading edge activates the registration sensor, the registration clutch turns off and the registration rollers stop turning. After the registration clutch turns off, the relay clutch [E] stays on for an extra 108 ms. This delay allows time for the paper to press against the registration rollers and buckle slightly to correct skew. The registration clutch energizes and the relay clutch re-energizes at the proper time to align the paper with the image on the drum. The registration and relay rollers feed the paper to the image transfer section.

The registration sensor is also used for paper misfeed detection.

11.11 PAPER FEED AND MISFEED DETECTION TIMING

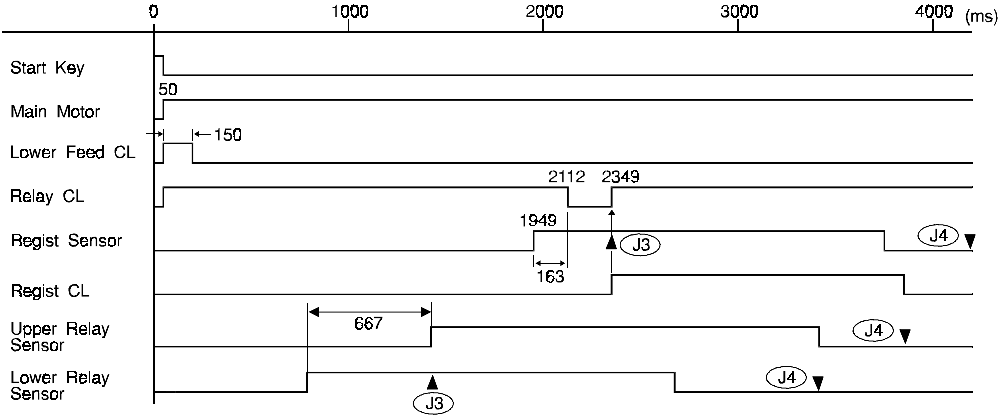
11.11.1 Paper Feed Tray

A153/A155/A156 copiers (A4 sideways)


0
1000
L.E
(1640)
2000
3000
(ms)
Start Key
Main Motor
Lower Separation SOL
Lower Pick-up SOL
Lower Feed CL
Relay CL
Upper Relay Sensor
Lower Relay Sensor
Regist Sensor
Regist CL
50
314
100
200
675
(124)
500
108
70
415
302
90
J1
J2

L.E. (Leading Edge): Start Time for Scanning the Original

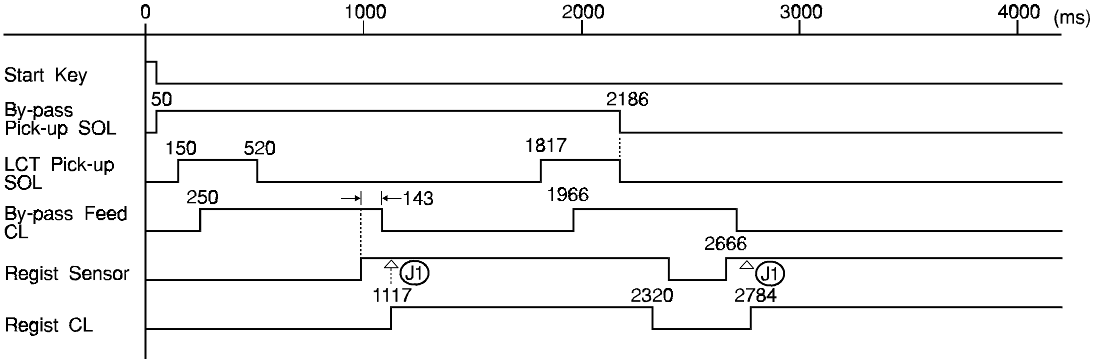
A157/A159/A160 copiers (A4 sideways)


0
1000
2000
3000
4000
(ms)
Start Key
Main Motor
Lower Feed CL
Relay CL
Regist Sensor
Regist CL
Upper Relay Sensor
Lower Relay Sensor
50
150
2112
2349
1949
163
667
J3
J4

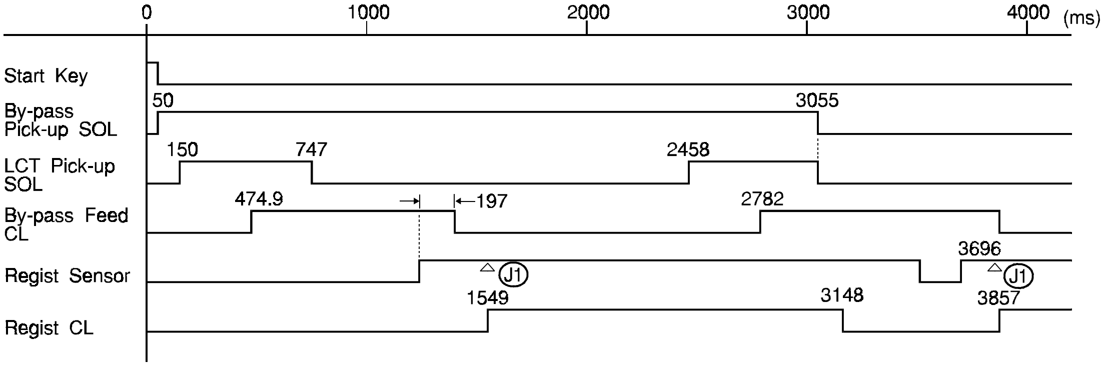
J1 and J2: Checks whether the sensors (relay sensors and registration sensor) are activated within 500 ms after the designated time for these sensors.

J3 and J4: Checks whether the sensors (relay sensors and registration sensor) are activated within 667 ms after the designated time for these sensors.

A155/A156 copiers (A4 sideways; two copies of a single-page original)



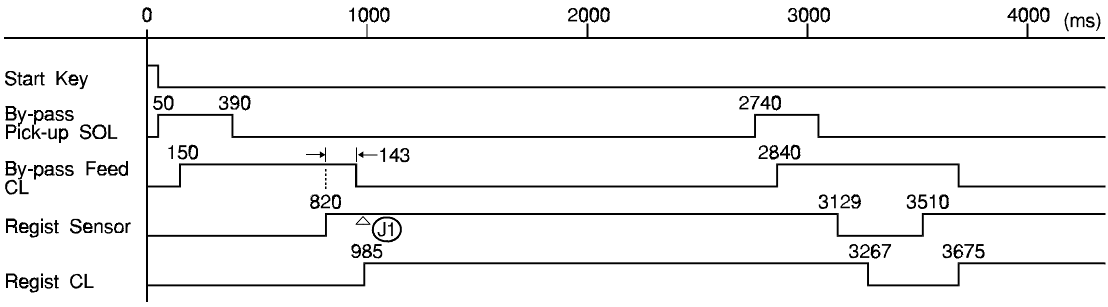
A159/A160 copiers (A4 sideways; two copies of a single-page original)



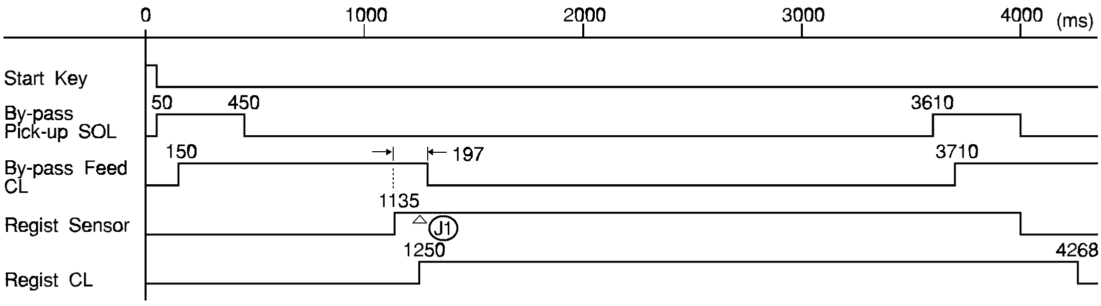
J1: Checks whether the registration sensor is activated when the registration clutch is turned on.

11.11.2 By-pass Feed

A153/A155/A156 copiers (A4 sideways)


0
1000
2000
3000
4000
(ms)
Start Key
By-pass Pick-up SOL
50
390
2740
By-pass Feed CL
150
143
2840
Regist Sensor
820
J1
3129
3510
Regist CL
985
3267
3675

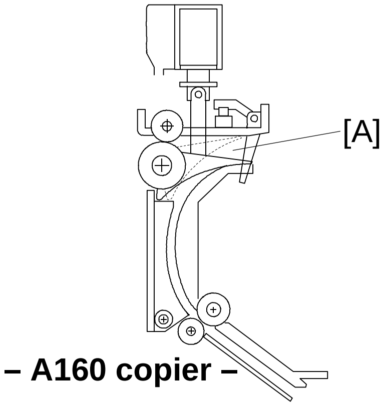
A157/A159/A160 copiers (A4 sideways)

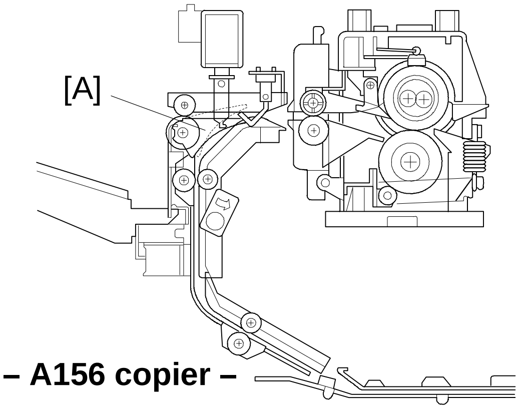

0
1000
2000
3000
4000
(ms)
Start Key
By-pass Pick-up SOL
50
450
3610
By-pass Feed CL
150
197
3710
Regist Sensor
1135
J1
Regist CL
1250
4268

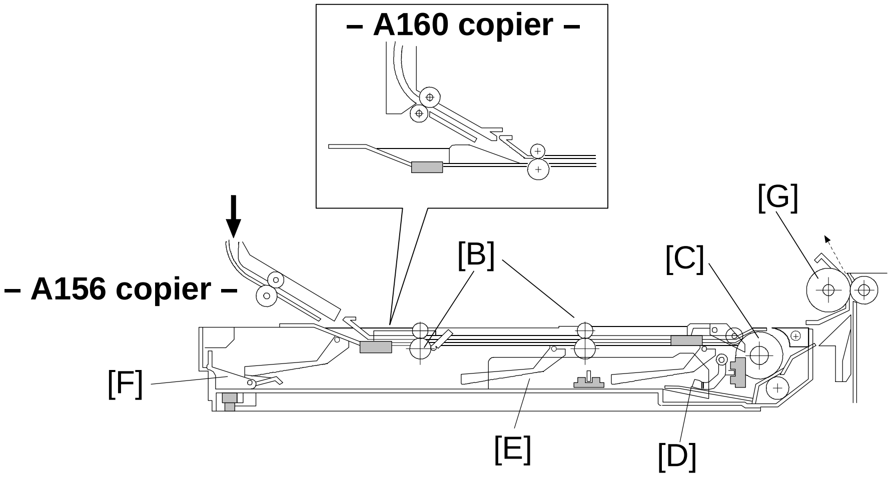
J1: Checks whether the registration sensor is activated when the registration clutch is turned on.

12. DUPLEX

12.1 OVERVIEW







The duplex tray is used for multiple two-sided and single two-sided copying. Note the paper feed path differences between the A156 and the A160.

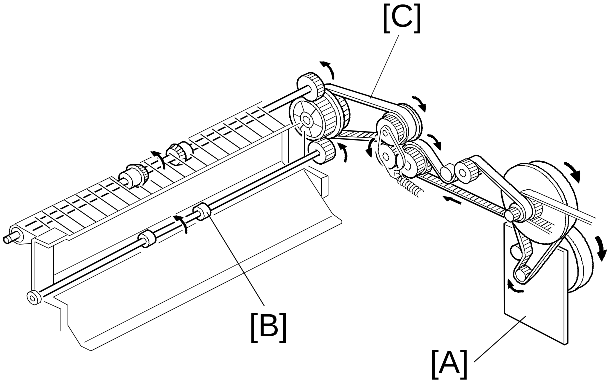
The junction gate [A] rotates up 1.1 seconds after the registration clutch has turned on, and the copy passes to the duplex tray. Shortly after the fusing exit sensor detects the leading edge of the paper, the entrance rollers [B] and duplex feed roller [C] start to rotate. At the same time, the duplex bottom plate [D] lowers.

The copy feeds over the duplex feed roller and into the tray. The jogger fences [E] and end fence [F] move inward to square the copy stack, then they move back 10.5 mm from the paper stack. After the final copy is delivered to the stack area, the jogger and end fences remain against the paper stack.

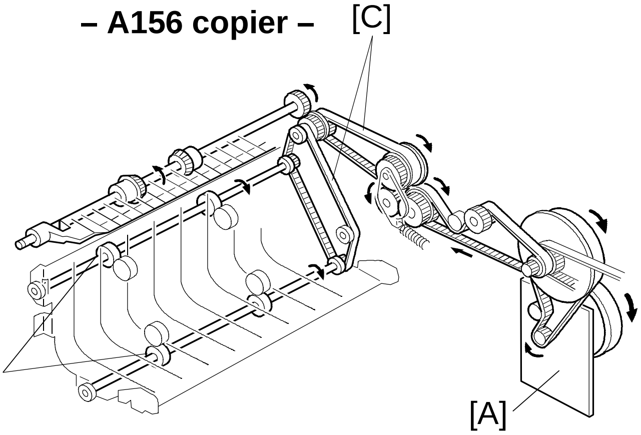
Soon after the final copy is squared, the duplex bottom plate lifts to the paper feed position and the duplex feed roller starts rotating counterclockwise to feed the top copy to the relay rollers [G]. The second side is then copied with the copy following the upper paper tray feed station paper path.

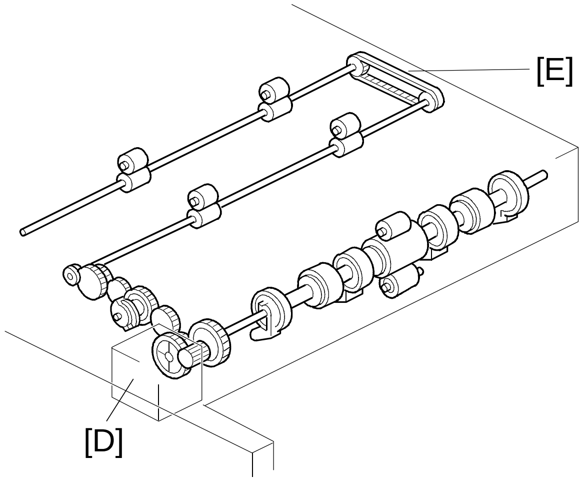
12.2 DRIVE MECHANISM

– A160 copier –



– A156 copier –

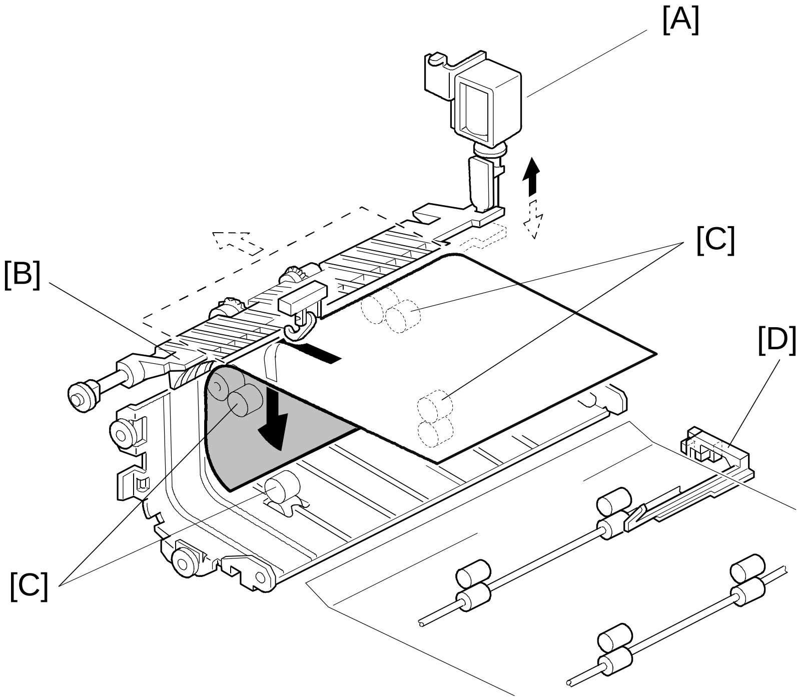




The main motor [A] drives the transport rollers [B] through the timing belts [C]. All rollers in the duplex tray are driven by the duplex feed motor [D] through a series of gears and a timing belt [E]. Helical gears are used to reduce noise.

The duplex feed motor also drives the duplex bottom plate up and down.

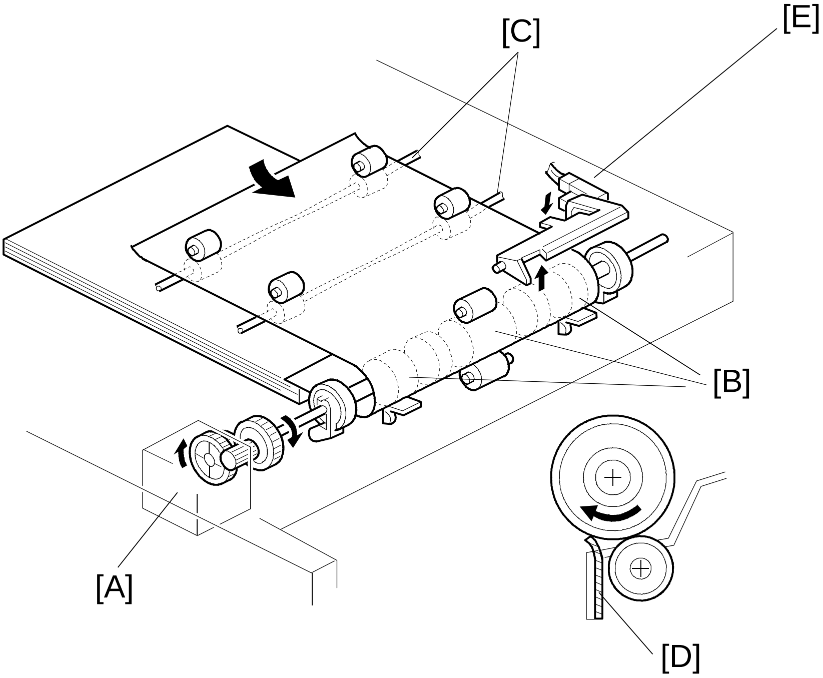
12.3 TURN GUIDE SECTION



The junction gate solenoid [A] is energized 1.1 seconds after the registration clutch has been turned on. Then, the junction gate [B] rotates upwards to direct the copy paper to the duplex turn guide section. The junction gate solenoid stays on until the first side copies are stacked in the duplex tray.

The copy is then directed to the duplex entrance guide by the transport rollers [C]. There is a duplex entrance sensor [D] for paper misfeed detection.

12.4 DUPLEX ENTRANCE TO DUPLEX TRAY

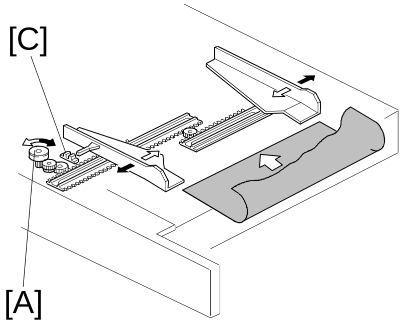


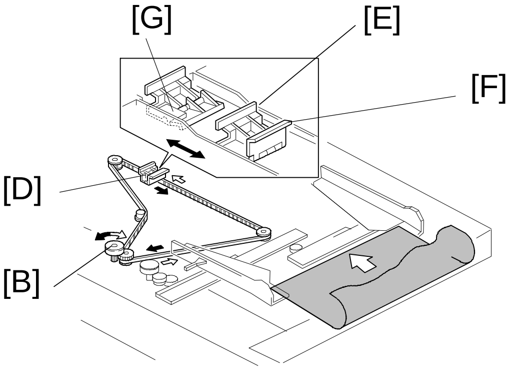
The duplex feed motor [A] starts turning 500 ms after the leading edge of the paper activates the fusing exit sensor. This motor drives the duplex feed rollers [B] and the duplex transport rollers [C]. The copy paper from the turn guide section is directed to the duplex tray through these rollers.

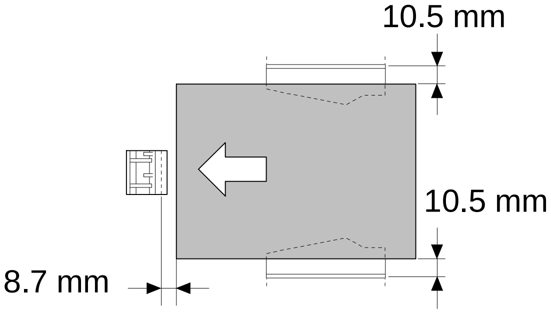
The tip of the flip mylar [D] moves to the left (front view) when the duplex feed rollers rotate to feed the copy into the duplex tray. The mylar presses the copy against the duplex feed rollers, ensuring that the trailing edge of the copy clears the guide plate.

The duplex turn sensor [E] detects the trailing edge of the paper as it enters the tray.

12.5 DUPLEX STACKING







There are two motors for driving the fences. The side jogger fences are driven by the side fence jogger motor [A]. The end jogger fence is driven by the end fence jogger motor [B]. Using two separate motors for the side and end fences allows the duplex tray to handle all paper sizes from A3/11" x 17" to A5/ 81/2" x 51/2" sideways.

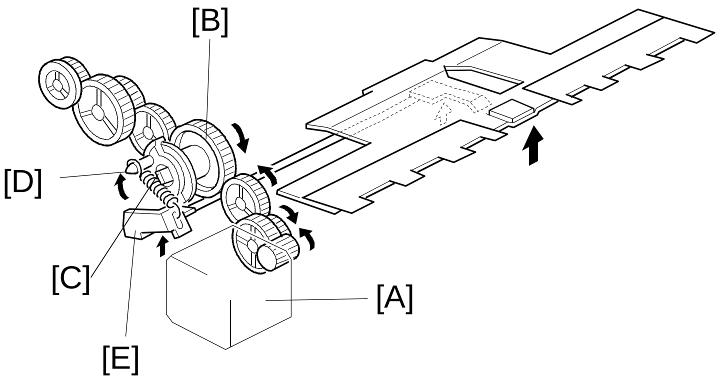
There are two home position sensors. One is for the jogger fences [C], and the other is for the end fence [D]. When the main switch turns on, the side fence jogger motor and the end fence jogger motor rotate to place the jogger fences and the end fence at their home positions.

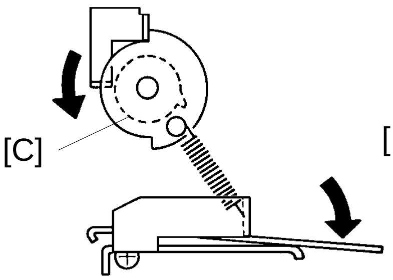
When the registration clutch turns on, the side fences move 10.5 mm, and the end fence moves 8.7 mm away from the selected paper size. Then, when the copy paper is delivered to the duplex tray, the jogger fences move inward to square the paper. (This is done 690 ms [A156] or 920 ms [A160] after the duplex turn sensor detects the trailing edge of copy paper. The duplex turn sensor is [E] in the diagram on the previous page) Shortly after this, the jogger fences move back to their previous positions. After the last copy of the first side copy run enters the duplex tray, the jogger fences remain against the paper stack.

There are two end fences. One [E] is for A3/11 x 17" size paper. The other [F] is for sizes smaller than B4. They are included as a unit. When A3/11 x 17" size paper is in the duplex tray, the end fence unit moves to the left and the B4 end fence rotates down as it is pressed against the end fence stopper [G].

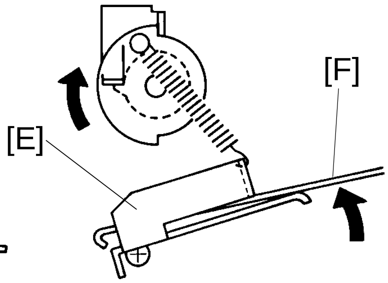
12.6 PAPER FEED FROM THE DUPLEX TRAY

12.6.1 Tray Lift Mechanism





- While copying the first side -



- While lifting the tray -

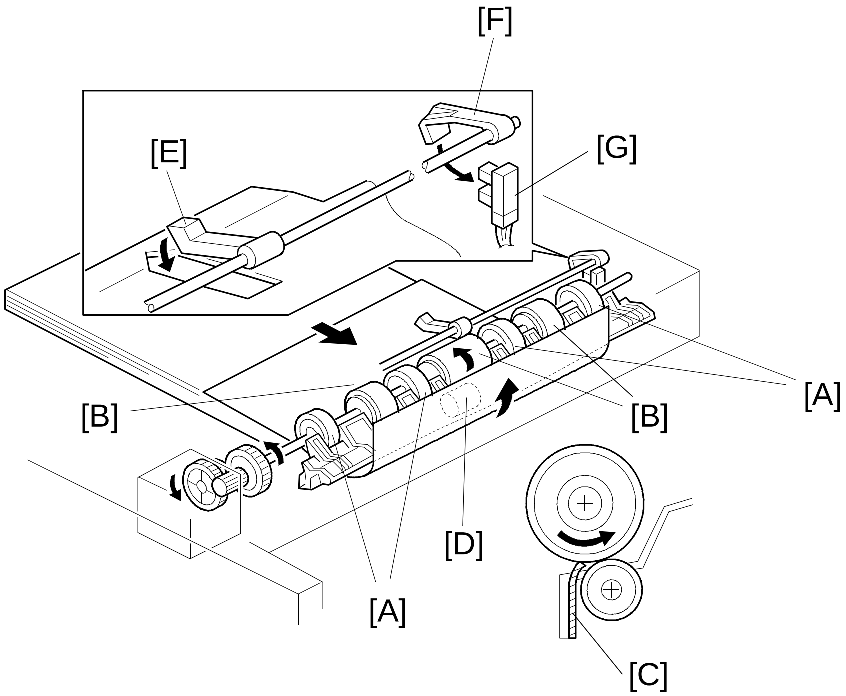
After the first side copies have been made, the duplex feed motor [A] changes direction, and the cam clutch gear [B] lifts up the duplex bottom plate through a series of gears.

While the first side is being copied, the duplex feed motor is rotating clockwise and the cam clutch gear is rotating counter clockwise (see the above drawing).

When all copies have been stacked in the duplex tray, the duplex feed motor rotates counterclockwise, and the cam clutch gear rotates clockwise. The cam clutch [C] also rotates clockwise because of the spring inside the clutch. The pin [D] on the clutch lifts up the duplex lift lever [E] through a spring, raising the duplex bottom plate [F].

When the duplex feed motor rotates clockwise again, the cam clutch rotates counterclockwise, and the bottom plate lowers.

12.6.2 Paper Feed System



While paper is being stacked in the duplex tray, the paper flatteners [A] correct curl at the leading edge of the paper.

After all the paper has been stacked in the duplex tray, the jogger fences square the paper stack and the duplex feed motor rotates counterclockwise briefly to prepare to feed the paper from the duplex tray. At this time, the bottom plate rises and the duplex feed rollers [B] move the flip mylars [C] back to the right (front view).

The duplex paper feed system consists of three sets of duplex feed rollers and a friction roller [D]. As the friction roller has a one-way bearing inside, it rotates freely during paper stacking and locks during paper feeding. The duplex feed rollers can feed only the top sheet of the stack because the friction rollers function in the same way as a friction pad does.

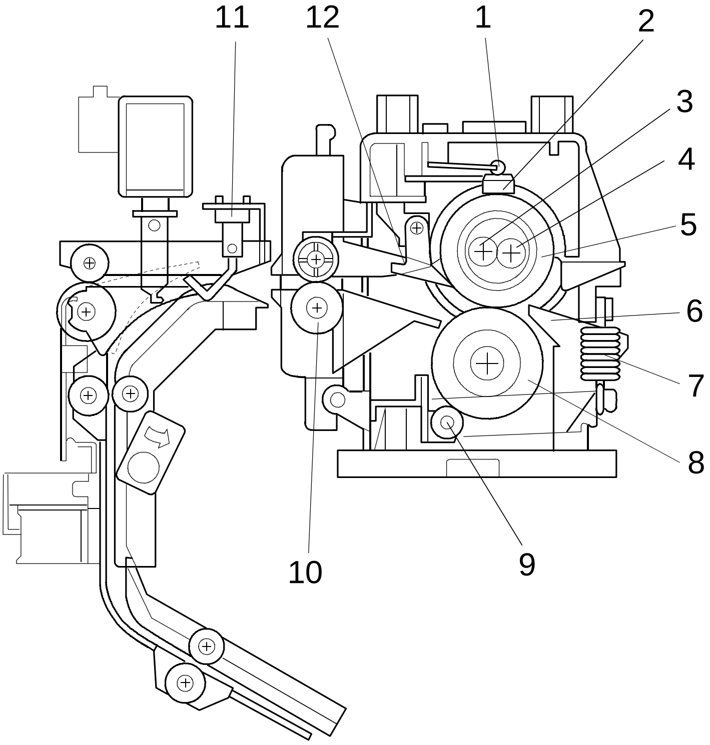
After that, the second side copies follow the upper paper tray feed station paper path.

After the duplex tray runs out the final copy, the paper end feeler [E] drops through a slot in the duplex bottom plate. The duplex paper end actuator [F], which is on the same shaft as the duplex paper end feeler, pivots into the duplex paper end sensor [G]. The sensor sends the signal to the cpu to stop the next paper feed cycle.

For a diagram of the paper feed path, see "Paper Path - Duplex Copying" in the Overall Machine Information section.

13. IMAGE FUSING

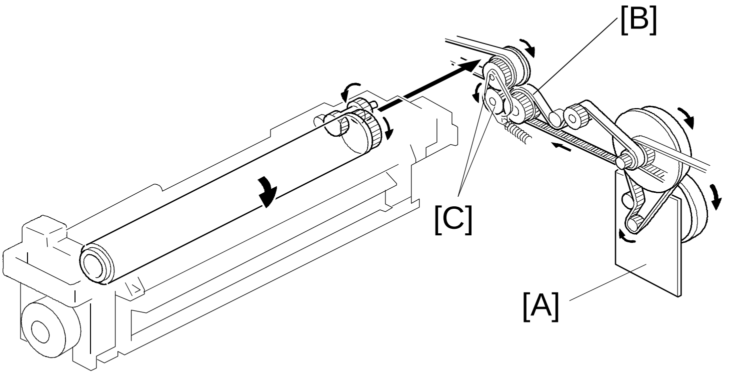
13.1 OVERVIEW

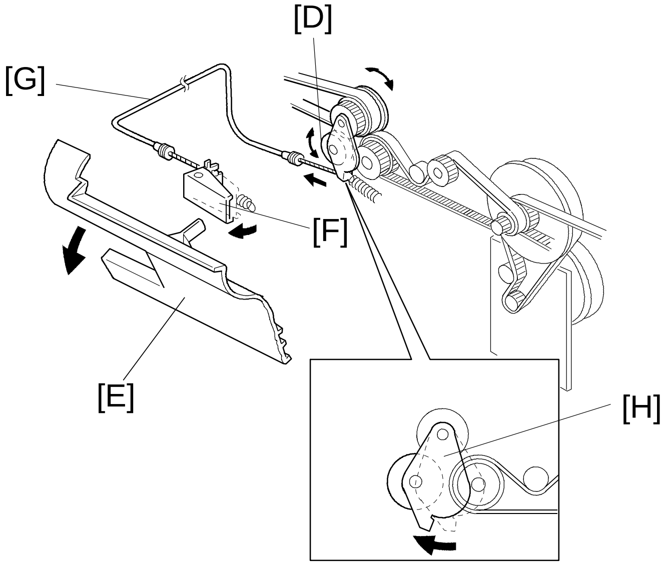


The fusing unit consists of the following parts:

1. Thermofuses (2 pcs)	7. Pressure springs
2. Thermistors (2 pcs)	8. Pressure roller
3. Secondary fusing lamp	9. Cleaning roller
4. Main fusing lamp	10. Fusing exit roller
5. Hot roller	11. Fusing exit sensor
6. Lower entrance guide	12. Hot roller strippers

13.2 FUSING DRIVE AND RELEASE MECHANISM



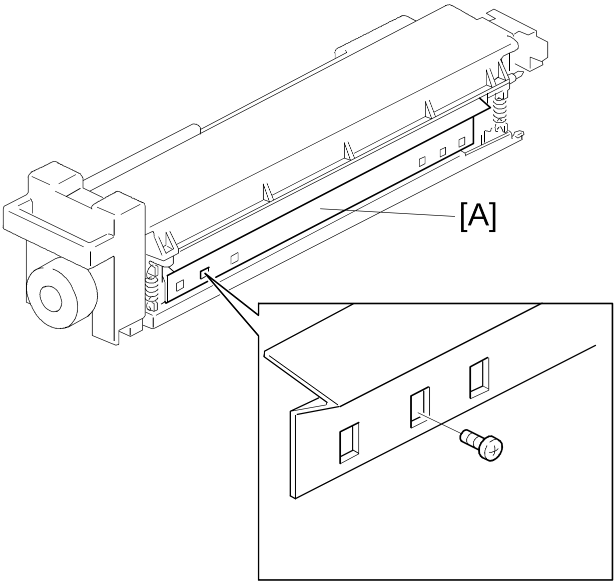


The main motor [A] drives the fusing unit through a timing belt [B] and some gears [C].

The fusing unit drive release mechanism automatically disengages the fusing unit drive gear [D] when the front cover [E] is opened. This allows the fusing unit drive gear to rotate freely so that misfed paper can be easily removed.

When the front cover is opened, the actuator plate [F] pulls release wire [G]. The wire pulls the fusing unit gear bracket [H] and the fusing unit drive is disengaged.

13.3 FUSING ENTRANCE GUIDE SHIFT MECHANISM



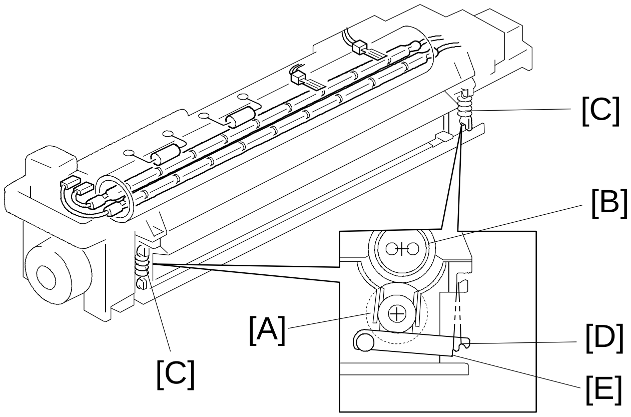
The entrance guide [A] for this machine is adjustable for thick or thin paper.

For thin paper, move the entrance guide up (this is the standard position). This slightly lengthens the paper path which prevents the paper from creasing in the fusing unit.

For thick paper, move the entrance guide down. This is because thick paper does not bend as easily, and is therefore less prone to creasing. Also, the lower setting allows more direct access to the gap between the hot and pressure rollers. This prevents thick paper from buckling against the hot roller, which can cause blurring at the leading edge of the copy.

There are three screw holes on each side for securing the entrance guide. Normally, the center screw hole on each side is used. The other screw holes are spare in case the center holes get damaged.

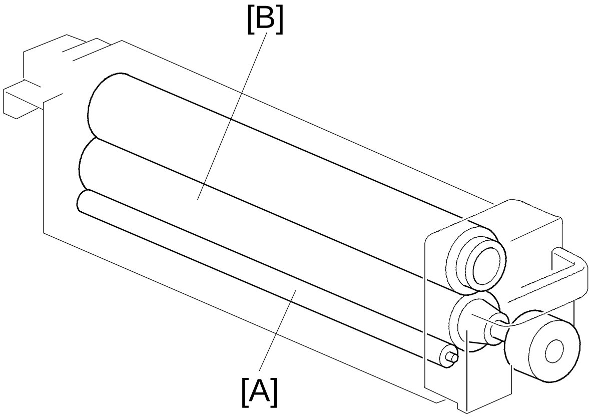
13.4 PRESSURE ROLLER



The pressure roller [A] is made of silicone rubber with a teflon tube coating. The pressure springs [C] constantly apply pressure between the hot roller [B] and the pressure roller.

The pressure can be changed by adjusting the position of the pressure springs. The upper position [D] is the normal setting. The lower position [E] increases the pressure and this prevents insufficient fusing by the fusing unit.

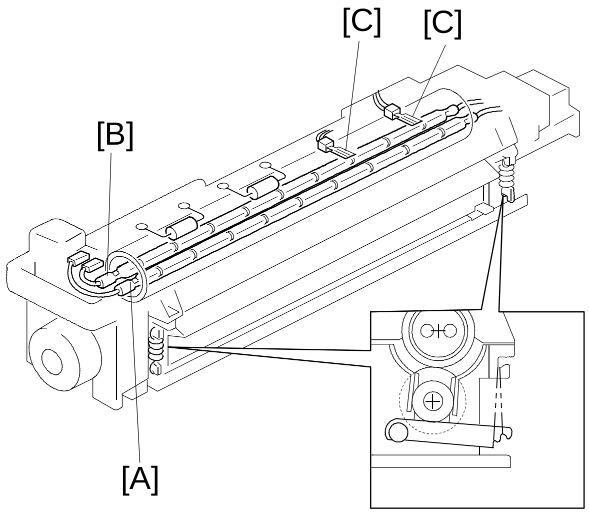
13.5 CLEANING MECHANISM

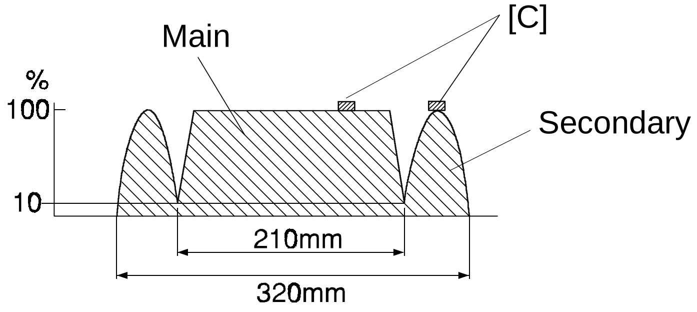


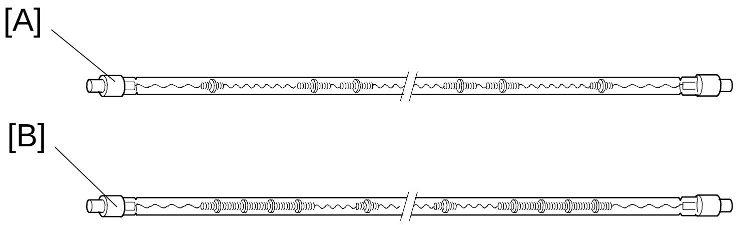
The cleaning roller [A] is always in contact with the pressure roller [B]. It collects toner and paper dust adhering to the surface of the pressure roller.

This is because the cleaning roller is made of metal and collects adhering matter more easily than the pressure roller (which has a teflon coating).

13.6 FUSING LAMP CONTROL

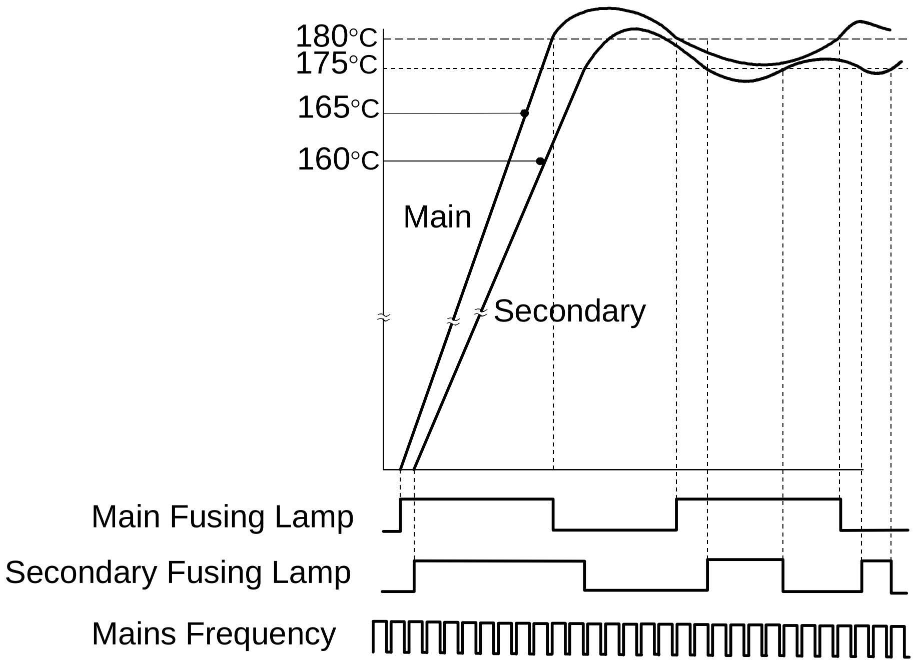






There are two fusing lamps in the hot roller: the main fusing lamp (550 W) [A] and the secondary fusing lamp (350 W) [B]. The positions of the filaments in the main and secondary fusing lamps are different. So, the main fusing lamp heats the center of the hot roller and the secondary fusing lamp heats both ends of the hot roller. Using this system, the temperature of the center and ends of the hot roller will be uniform.

The temperatures at the center and the side are monitored by different thermistors [C].



– A153/A155/A156 copiers –

	Fusing Lamp	Standby Temp.	Operation Temp.
A153/A155/A156 copiers	Main	165°C	180°C
	Secondary	160°C	175°C
A157/A159/A160 copiers	Main	160°C	175°C
	Secondary	160°C	175°C

When the main switch turns on, the CPU checks the mains frequency for 500 ms; this is done in case phase control mode is selected later. Then the CPU turns on the main fusing lamp. After 3 more seconds, the secondary fusing lamp is turned on. This delay reduces the surge current after the main switch is turned on.

When both thermistors detect the stand-by fusing temperature (see the above table), the copier starts fusing idling. If the fusing temperature was above 50°C when the main switch was turned on, the copier does not go into the fusing idle cycle.

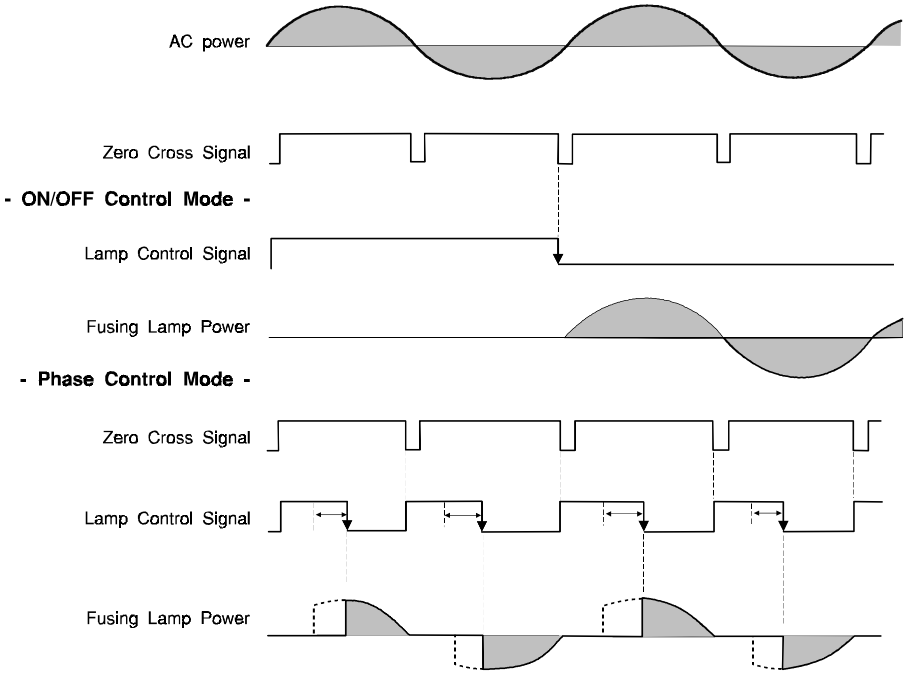
If the fusing lamps are turned on while the exposure lamp is on, the power supplied to the exposure lamp may fluctuate, possibly degrading the copy quality. To prevent this, in this machine, the fusing lamps can either stay off or change from on to off while the exposure lamp is on.

There are two types of fusing unit control: on/off control, and phase control. The mode can be selected with SP1-104.

- On/Off Control -

When both thermistors detect the operation temperature, both fusing lamps are turned off. After that, the CPU keeps the operation temperature constant by turning the lamps on and off. This is the default setting.

- Phase Control Mode -


AC power
Zero Cross Signal
- ON/OFF Control Mode -
Lamp Control Signal
Fusing Lamp Power
- Phase Control Mode -
Zero Cross Signal
Lamp Control Signal
Fusing Lamp Power

In on/off control mode, the ac drive board supplies full ac power to the fusing lamps.

In phase control mode, the main board CPU controls the lamp control signal duty cycle which in turn affects the duty cycle of the mains supply.

Phase control only affects the main fusing lamp. The secondary lamp is always controlled using on/off control.

When the main switch is turned on, the main board starts to output the lamp control signal, which is generated from the zero cross signal.

The duty cycle of the lamp control signal depends on the temperature of the hot roller. When the hot roller temperature is low, the lamp control signal pulse will be wider, and the mains duty cycle will be wider. Conversely, if the roller temperature is high, the duty cycles will be smaller to reduce the temperature.

Phase control mode is selected only if the user has a problem with electrical noise on the same circuit or interference.

13.7 OVERHEAT PROTECTION

If the hot roller temperature stays higher than 230°C for 5 seconds, the CPU cuts off the power to the fusing lamps. At the same time, E-543 lights on the operation panel.

Even if the thermistor overheat protection fails, thermofuses are installed in series with the common ground line of the fusing lamps. If the temperature of either thermofuse reaches 169°C, the thermofuse opens, removing power from the fusing lamps. At the same time, the copier stops operating.

13.8 ENERGY SAVER FUNCTIONS

When the copier is not in use, the energy saver function reduces power consumption by decreasing the fusing temperature.

If the auto energy saver mode timer (SP5-102) runs out, the copier automatically enters energy saver mode. The fusing lamp switches off until the lamp reaches the temperature selected with SP1-105-002. The lower this temperature is, the longer the waiting time until the copier returns to the ready condition.

Also, when the Energy Saver/Clear Mode key is held down for over 1 s, the copier goes into the energy saver mode. The Energy Saver indicator turns on and all the other indicators turn off.

There is also an auto-off timer that can be programmed with SP5-305. If this timer expires, the machine cuts all power to the fusing unit.

The copier returns to the ready condition if someone stands at the front of the copier (in other words, when the Auto Response sensor is activated).

SECTION 3

INSTALLATION

1. INSTALLATION REQUIREMENTS

1.1 ENVIRONMENT

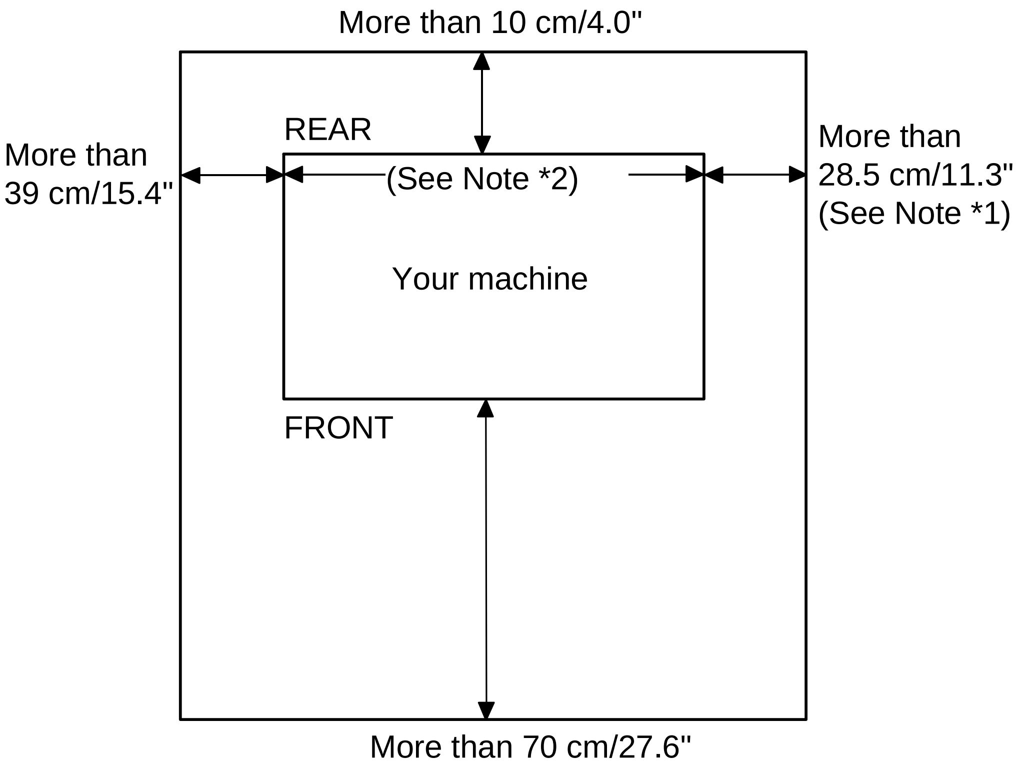
1. Temperature Range: 10°C to 30°C (50°F to 86°F)
2. Humidity Range: 15% to 90% RH
3. Ambient Illumination: Less than 1,500 lux (do not expose to direct sunlight.)
4. Ventilation: Room air should turn over at least 3 times/hour.
5. Ambient Dust: Less than 0.10 mg/m^3 (2.7 x 10^{-6} oz/yd^3)
6. If the place of installation is air-conditioned or heated, place the machine:
   a) where it will **not** be subjected to sudden temperature changes.
   b) where it will **not** be directly exposed to cool air from an air conditioner.
   c) where it will **not** be directly exposed to heat from a heater.
7. Do not place the machine where it will be exposed to corrosive gases.
8. Do not install the machine at any location over 2,000 m (6,500 feet) above sea level.
9. Place the copier on a strong and level base.
10. Do not place the machine where it may be subjected to strong vibrations.

1.2 MACHINE LEVEL

1. Front to back: Within 5 mm (0.2") of level
2. Right to left: Within 5 mm (0.2") of level

1.3 MINIMUM SPACE REQUIREMENTS

Place the copier near the power source, providing clearance as shown:


More than 10 cm/4.0"
REAR
More than
39 cm/15.4"
(See Note *2)
More than
28.5 cm/11.3"
(See Note *1)
Your machine
FRONT
More than 70 cm/27.6"

NOTE: *1. In machines without an LCT, the distance between the wall and the edge of the by-pass feed table must be more than 28.5 cm/11.3".

*2. Copier only + Receiving Tray
103.0 cm/40.6" (with LCT: 125.8 cm/49.6")
Copier + A554 Sorter/Stapler
103.2 cm/40.7" (with LCT: 126.0 cm/49.7")
Copier + A555 Sorter/Stapler
100.1 cm/39.5" (with LCT: 122.9 cm/48.4")
Copier + A556 Sorter
96.6 cm/38.1" (with LCT: 119.4 cm/47.1")

1.4 POWER REQUIREMENTS

! CAUTION

A. Be sure to ground the machine.

B. Make sure the plug is firmly inserted in the outlet.

C. Avoid multi-wiring.

1. Input voltage level:

120V/60Hz:	More than 12 A (for North America)
220V~240V/50Hz:	More than 7 A (for Europe)
220V/50Hz:	More than 7 A (for Asia)
110V/60Hz:	More than 12 A (for Taiwan)
220V/60Hz:	More than 7 A (for Saudi Arabia, Philippines)

2. Permissible voltage fluctuation: 10%

3. Do not set anything on the power cord.

2. COPIER INSTALLATION

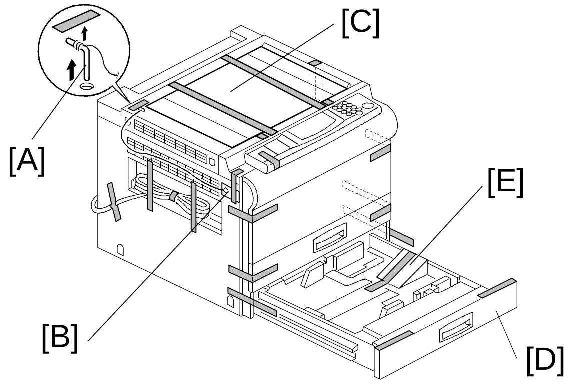
2.1 ACCESSORY CHECK

Check the quantity and condition of the accessories in the box against the following list:

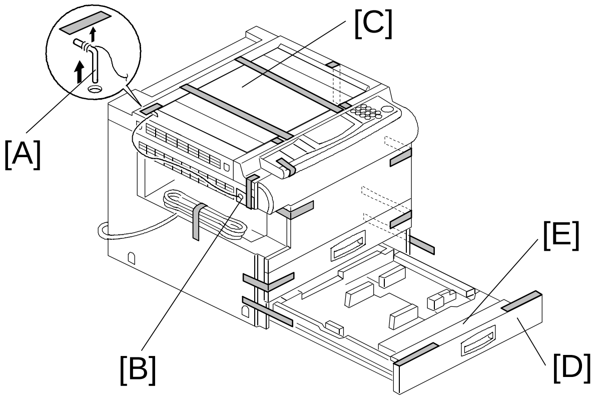
Description	Qty
1. Paper Size Decal	1
2. Symbol Explanation Decal (except for the A156 copier)	1
3. Optional Zoom Function Decal	1
4. Optional Margin Adjustment Function Decal	1
5. Combine Originals Explanation Decal (except for the A156 copier)	1
6. Receiving Tray	1
7. Operating Instructions (except for –27 machines)	1
8. User Survey Card (–17 machines only)	1
9. New Equipment Condition Report	1

2.2 COPIER INSTALLATION PROCEDURE

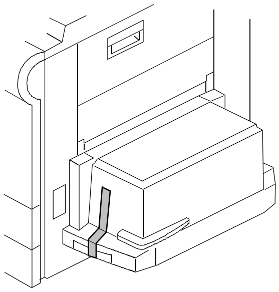
- A153/A155/A156 copiers -



- A157/A159/A160 copiers -



- A155/A156/A159/A160 copiers -



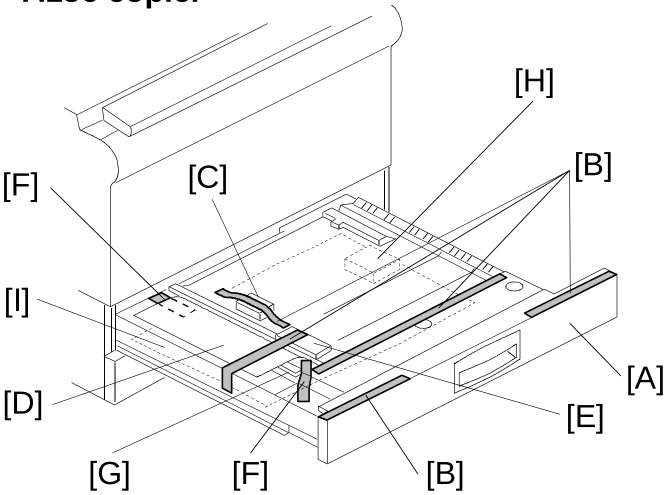
! **CAUTION**
Never lift the machine by holding the LCT, or the LCT will break.

NOTE: (1) Keep the shipping retainers after installing the machine. They will be reused if the machine is moved to another location in the future.

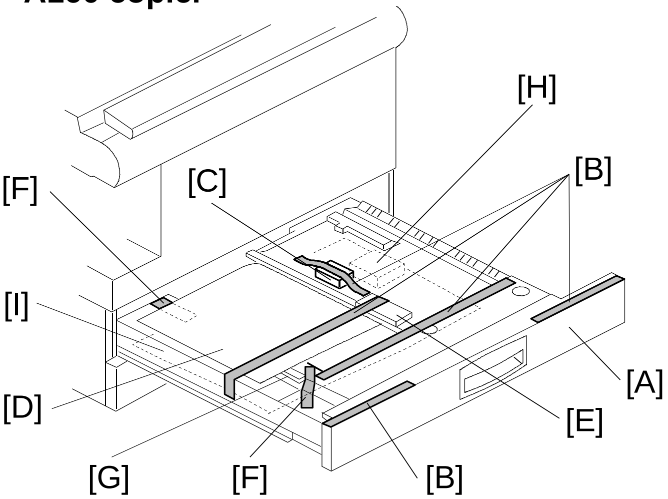
(2) Proper reinstallation of the shipping retainers is required in order to avoid any transport damage. It is most important to put back the scanner lock pin when transporting this copier. If not, skewed image may result.

1. Remove the scanner lock pin [A] and red tag [B] as shown.
2. **A155/A156/A159/A160 copiers only:** Remove the strips of tape and the sheet of paper [C]. Also, remove the strip of tape on the LCT.
3. Pull out the paper tray [D], and remove the strips of tape and the bottom plate stopper [E]. Then install the paper tray in the copier (1 tray for duplex machines and 2 trays for non-duplex machines).

- A156 copier -

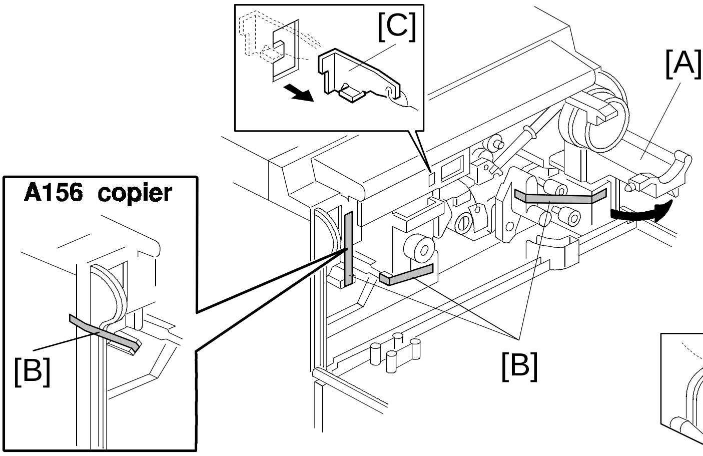


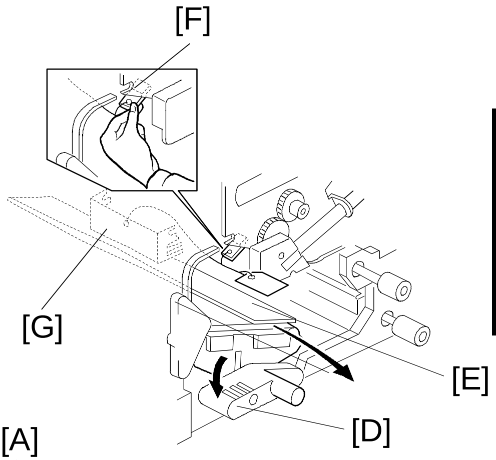
- A160 copier -



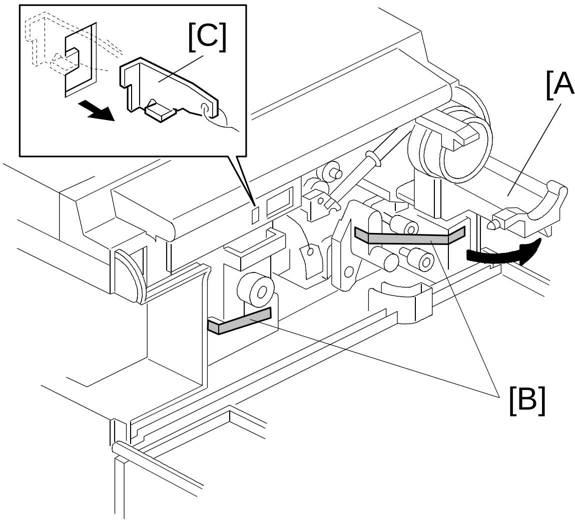
4. **A156/A160 copiers only:**
   1) Pull out the duplex tray [A] and remove the strips of tape [B].
   2) Remove the guide roller stopper [C] and a sheet of paper [D].
   3) Open the upper duplex guide plate [E] and remove the strips of tape [F].
   4) Open the lower duplex guide plate [G], and remove the styrofoam support [H] and the sheet of paper [I].
   5) Install the duplex tray in the copier.

- A153/A155/A156 copiers -

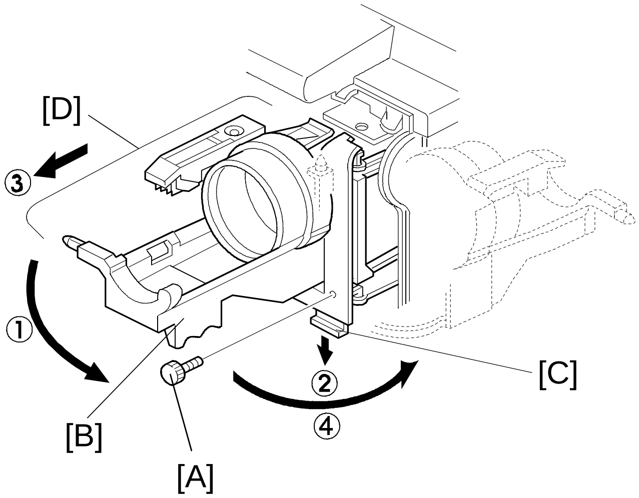


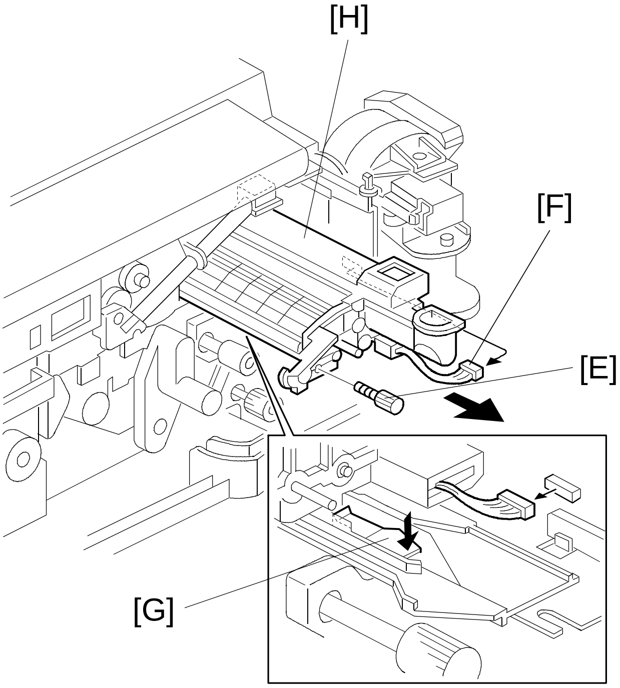


- A157/A159/A160 copiers -



5. Open the front cover and swing out the toner bottle holder [A].
6. Remove the strips of tape [B].
7. Remove the switch actuator lock bracket [C] as shown.
8. Turn the "A1" lever [D] counterclockwise to lower the transfer belt unit. Then remove the cushion sheet [E].
9. Remove the blade release wedge [F] together with the pick off pawl release mylar [G].
10. Return the "A1" lever to the set position.



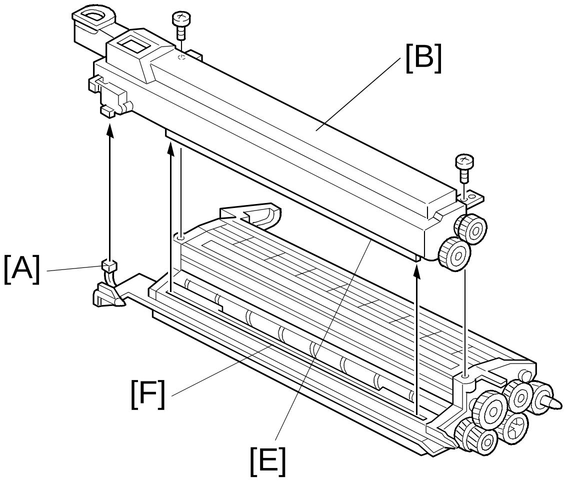


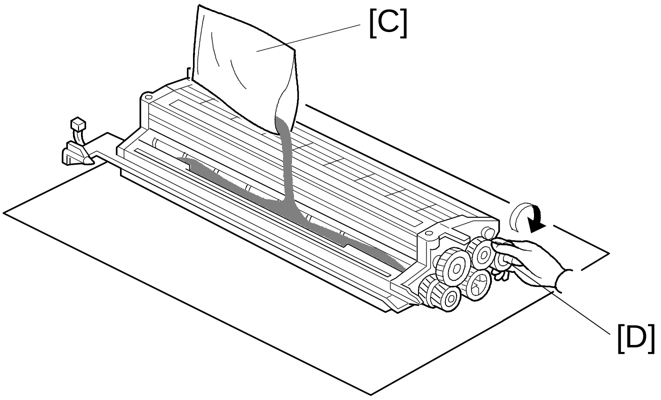
11. Remove the knob screw [A].

12. ① Swing out the bottle holder [B] and ② pull down the lock lever [C]. ③ Then slide out the bottle holder assembly [D] and ④ swing out the bottle holder assembly [D].

13. Remove the knob screw [E] and disconnect the white connector [F].

14. Pull down the development unit lock lever [G] from under the plate and pull out the development unit [H]. Then place it on a clean sheet of paper.





15. Disconnect the connector [A] and separate the toner supply unit [B] from the development unit (2 screws).

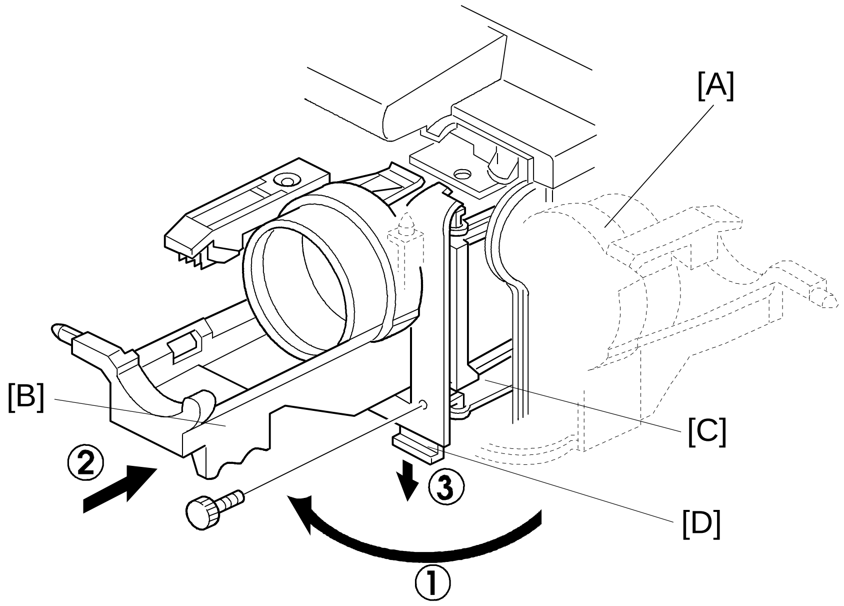
16. Pour about half a pack of developer [C] into the development unit. Then rotate the outer gear [D] as shown to distribute the developer evenly. Then pour in all the remaining developer and rotate the gear again.

    NOTE: To prevent the developer from spilling, do not rotate the gears in the other direction.

17. Remount the toner supply unit on the development unit (2 screws) and connect the white connector.

    NOTE: Make sure that the positioning rib [E] sits in the groove [F].

18. Install the development unit in the copier (1 knob screw and 1 connector).



19. Swing in the bottle holder assembly [A] so that the toner bottle holder [B] and the slide rail [C] are **aligned straight**.

    IMPORTANT: Do not swing the bottle holder into the machine before doing step 20.

20. Slide the bottle holder assembly in as described below:
    1) Slide the bottle holder assembly into its lock position while pressing down the bottle holder lock lever [D].
    2) When the bottle holder assembly reaches its lock position, push up the bottle holder lock lever so that the knob screw holes are aligned.
    3) Secure the bottle holder lock lever with the knob screw.

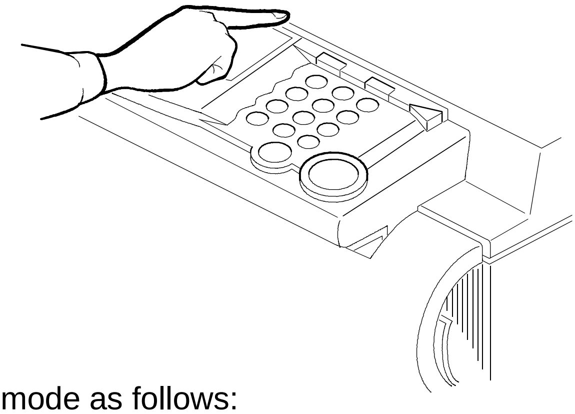
! CAUTION

Do not swing the bottle holder assembly all the way into its original position in the machine without sliding and locking it into position exactly as described above. Otherwise, the assembly will be damaged.

21. Install a toner bottle by following the instructions placed on the reverse side of the front cover.

22. Swing in the toner bottle holder to its original position and close the front cover.

23. Plug in the copier and turn on the main switch.



24. Enter SP mode as follows:
    1) Press the "Clear Modes" key.
    2) Enter "107" using the numeric keys.
    3) Hold down the "Clear/Stop" key for more than 3 seconds.

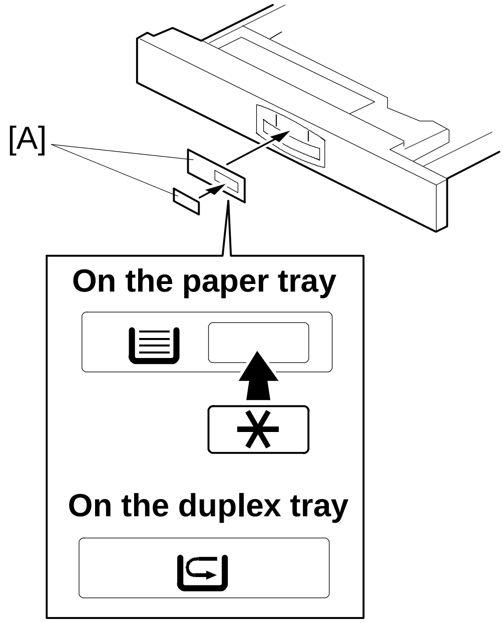
    NOTE: When SP mode is selected, "1" blinks in the 3rd digit of the copy counter, the Auto Image Density indicator starts blinking, and the reduce/enlarge indicator turns off.

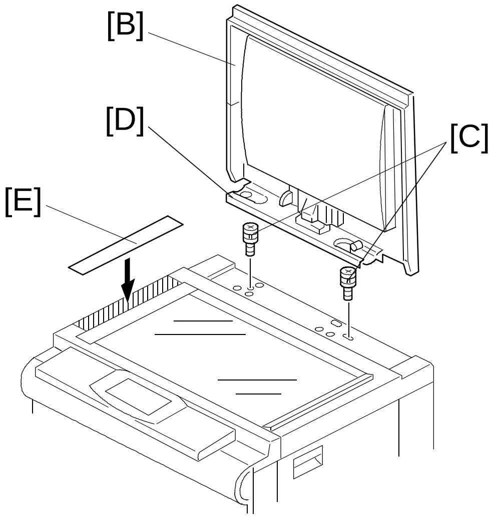
25. Perform the "Development unit initial setting" SP mode as follows:
    1) Enter "2" and press the "Enter" key.
    2) Enter "902" and press the "Enter" key.
    3) Press the "Start" key.

    NOTE: 1) This SP mode performs the TD sensor initial setting and then performs the forced toner supply twice.
    2) The machine will automatically stop when Development Unit initial setting is completed. (It takes about 3 minutes.)

26. **A156 copier only:**
    Select the proper language for the guidance display as follows:
    1) Press the "Clear Modes" key twice.
    2) Enter "5" in the 3rd digit of the copy counter and press the "Enter" key.
    3) Enter "910" and press the "Enter" key.
    4) Enter the number for the desired language in the three-digit indicator and press the "Enter" key.
       0:Japanese 1:English 2:French 3:German 4:Italian 5:Spanish
       6:Swedish 7:Portuguese 8:Danish 9:Norwegian 10:Finnish 11:Dutch

27. Press the "Clear Modes" key three times to exit SP mode.





28. Pull out the paper tray and load paper into it. (The paper size and direction for each tray should be as specified by the customer.)

    NOTE: The side and rear fences should be properly positioned.

29. Select the appropriate paper size for the paper trays in the main body by sliding the paper size slider into the correct position (see section 2.3.2 "Paper size selection for the copier paper trays" for details).

30. **When a paper tray unit is installed:** Enter the proper paper size for each paper tray by following the procedure shown in section 2.3, "Paper Size Selection" and in "Service Tables - SP5-019: Paper Size Setting".

31. Load paper into the paper trays and the copy tray.

32. Attach the appropriate paper size decals [A] to the paper trays.
    Also (A156/A160 copiers only), attach the duplex decal to the duplex tray.

    NOTE: Paper size decals are used also for the paper tray unit. Save the remaining decals for use with the paper tray unit.

33. Install the optional platen cover [B] as follows if necessary:
    1) Install 2 stud screws [C] on the top cover as shown.
    2) Position the platen cover bracket [D] on the stud screws and slide it to the left.

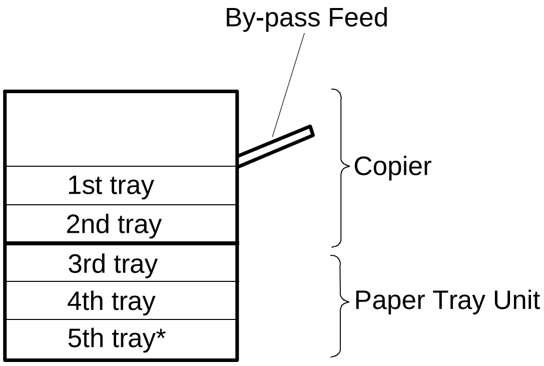
34. **All models except the A156:** Attach the symbol explanation decal [E] to the top cover as shown. (If the ARDF will be installed, stick the decal on the ARDF exit cover. Refer to the ARDF installation procedure.)

35. Check the copy quality and machine operation.

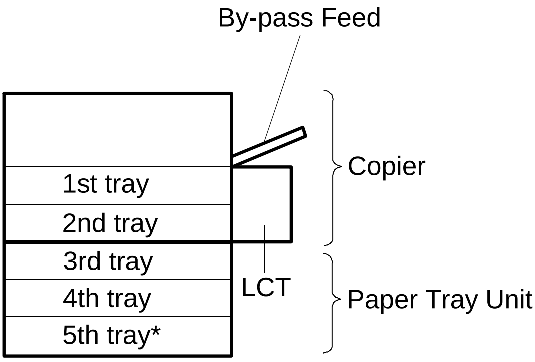
2.3 PAPER SIZE SELECTION

2.3.1 Paper Feed Station Definition

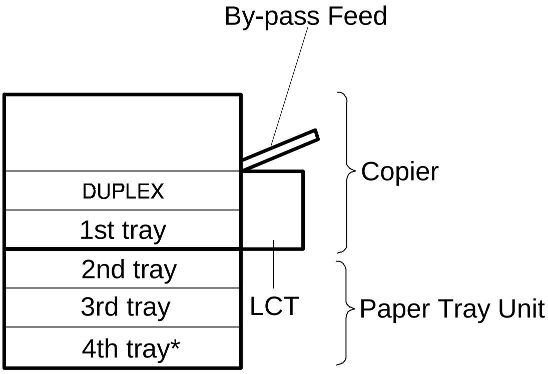
A153 and A157 copiers


By-pass Feed
1st tray
2nd tray
3rd tray
4th tray
5th tray*
Copier
Paper Tray Unit

A155 and A159 copiers


By-pass Feed
1st tray
2nd tray
3rd tray
4th tray
5th tray*
LCT
Copier
Paper Tray Unit

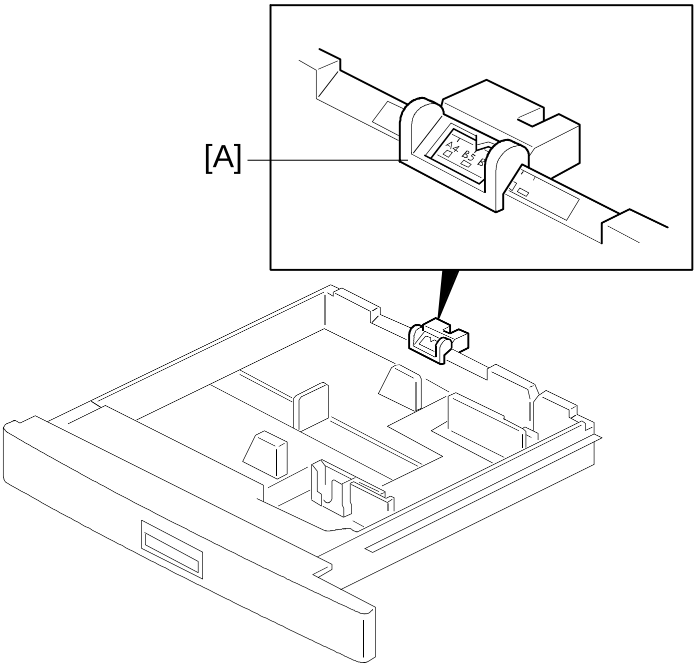
A156 and A160 copiers


By-pass Feed
DUPLEX
1st tray
2nd tray
3rd tray
4th tray*
LCT
Copier
Paper Tray Unit

The diagrams on this page show how the paper feed stations are numbered in the various models.

NOTE: *A549 paper tray unit only

2.3.2 Paper Size Selection for Copier Paper Trays



For the 1st tray and 2nd tray for A153, A155, A157, and A159 copiers, and the 1st tray for A156 and A160 copiers, slide the paper size slider [A] to the paper size indication that matches the paper size in the tray. The following paper sizes can be selected with the paper size slider.

A4/A3 Version	LT/DLT Version
A3 (lengthwise)	11" x 17"
B4 (lengthwise)	8 1/2" x 14"
A4 (lengthwise)	8 1/2" x 11"
A4 (sideways)	11" x 8 1/2"
B5 (lengthwise)	A4 (lengthwise)
B5 (sideways)	A4 (sideways)
A5 (sideways)	8 1/2" x 5 1/2"
8 1/2" x 11"	11" x 15"
11" x 8 1/2"	10" x 14"
11" x 17"	F4 (8 1/2" x 13") (lengthwise)
F4 (8 1/2" x 13") (lengthwise)	8" x 10"

NOTE: For the 1st tray, a wider range of paper sizes can be selected with SP mode. See section 2.3.4 and "Service Tables - SP5-019: Paper Size Setting".

2.3.3 Paper Size Selection for the Paper Tray Unit, LCT, and By-pass Feed

For the paper tray unit, LCT and by-pass feed, select the paper size with SP mode (SP5-019) using the following procedure.

1. Enter SP mode as follows;
   1) Press the "Clear Modes" key.
   2) Enter "107" with the numeric keys.
   3) Hold down the "Clear/Stop" key for more than 3 seconds.

   NOTE: When SP mode is selected, "1" blinks in the 3rd digit of the copy counter, the Auto Image Density indicator starts blinking, and the reduce/enlarge indicator turns off.
2. Enter SP5-019 as follows
   1) Enter "5" and press the "Enter" key.
   2) Enter "019" and press the "Enter" key.
3. Press the + or – key until the required 3rd level program number is selected.

3rd level (001~008 can be selected with the + and – keys.	A153/A157 copiers		A155/A159 copiers		A156/A160 copiers	
	Paper Tray Indicator	**Paper Size Selection**	**Paper Tray Indicator**	**Paper Size Selection**	**Paper Tray Indicator**	**Paper Size Selection**
SP5-019-001	—	—	—	—	—	—
SP5-019-002	—	—	—	—	▷ 2	2nd Tray
SP5-019-003	▷ 3	3rd Tray	▷ 3	3rd Tray	▷ 3	3rd Tray
SP5-019-004	▷ 4	4th Tray	▷ 4	4th Tray	▷ 4	4th Tray
SP5-019-005	▷ 5	5th Tray	▷ 5	5th Tray	✋	By-pass Feed
SP5-019-006	✋	By-pass Feed	✋	By-pass Feed	▷ T	LCT
SP5-019-007	▷ 1	SPECIAL*	▷ T	LCT	▷ 1	SPECIAL*
SP5-019-008	—	—	▷ 1	*SPECIAL	—	—

Example: In an A155 copier, to select the paper size for the LCT, select 3rd level program 007.

NOTE: The 3rd level program number is blinking in the 1st digit of the copy counter.
Depending on the 3rd level program number, the paper tray indicator changes.
SP settings for each 3rd level program number are blinking in the reduce/enlarge indicator.

*SPECIAL: See section 2.3.4 and "Service Tables - SP5-019: Paper Size Setting" for how to select from a wider range of paper sizes for the 1st tray.

4. Select the required SP setting with the numeric keys (see Service Tables - Paper Size Settings), then press the "Enter" key.

   NOTE: If you input the wrong setting by mistake, you can cancel it by pressing the "Clear/Stop" key before pressing the "Enter" key.

5. Leave SP mode by pressing the "Clear Modes" key three times.

2.3.4 Special Paper Size Selection for the 1st Tray

For the 1st tray, a wider range of paper sizes can be selected using SP5-019-007 for A153, A156, A157 and A160 copiers, or SP5-019-008 for A155 and A159 copiers.

NOTE: The definition of the 1st tray differs with the type of copier. See section 2.3.1 "Paper Feed Station Definition".

If a special paper size is selected, the machine ignores the paper size set with the paper size slider.

See Service Tables - Paper Size Settings for how to select a special paper size using SP5-019.

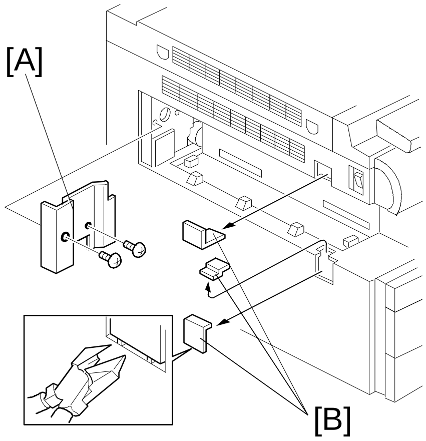
2.4 SORTER ADAPTER INSTALLATION (OPTION FOR A157, A159, AND A160 COPIERS ONLY)

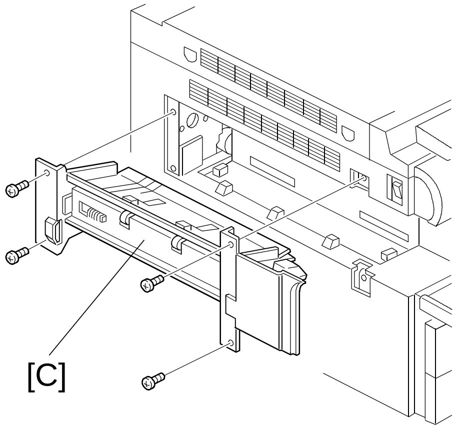
2.4.1 Accessory Check

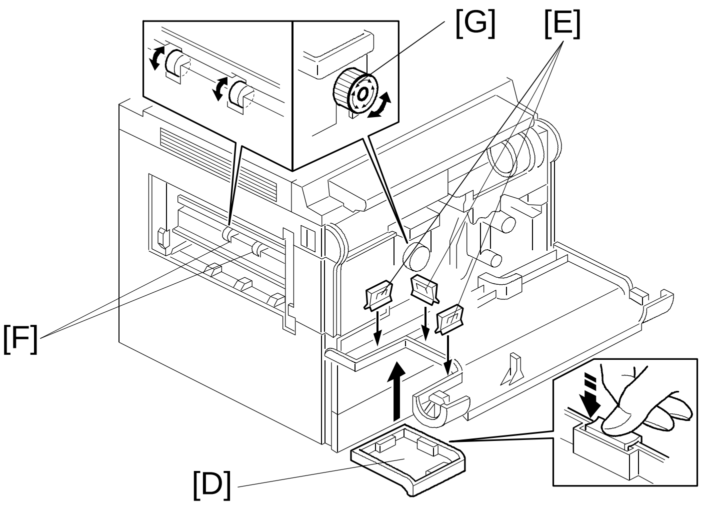
Check the quantity and condition of the accessories in the box against the following list.

Description	Qty
1. Installation Procedure	1
2. Sorter Adapter Front Cover	1
3. Clip	3
4. Philips Pan Head Screw M4 x 6	4

2.4.2 Installation Procedure



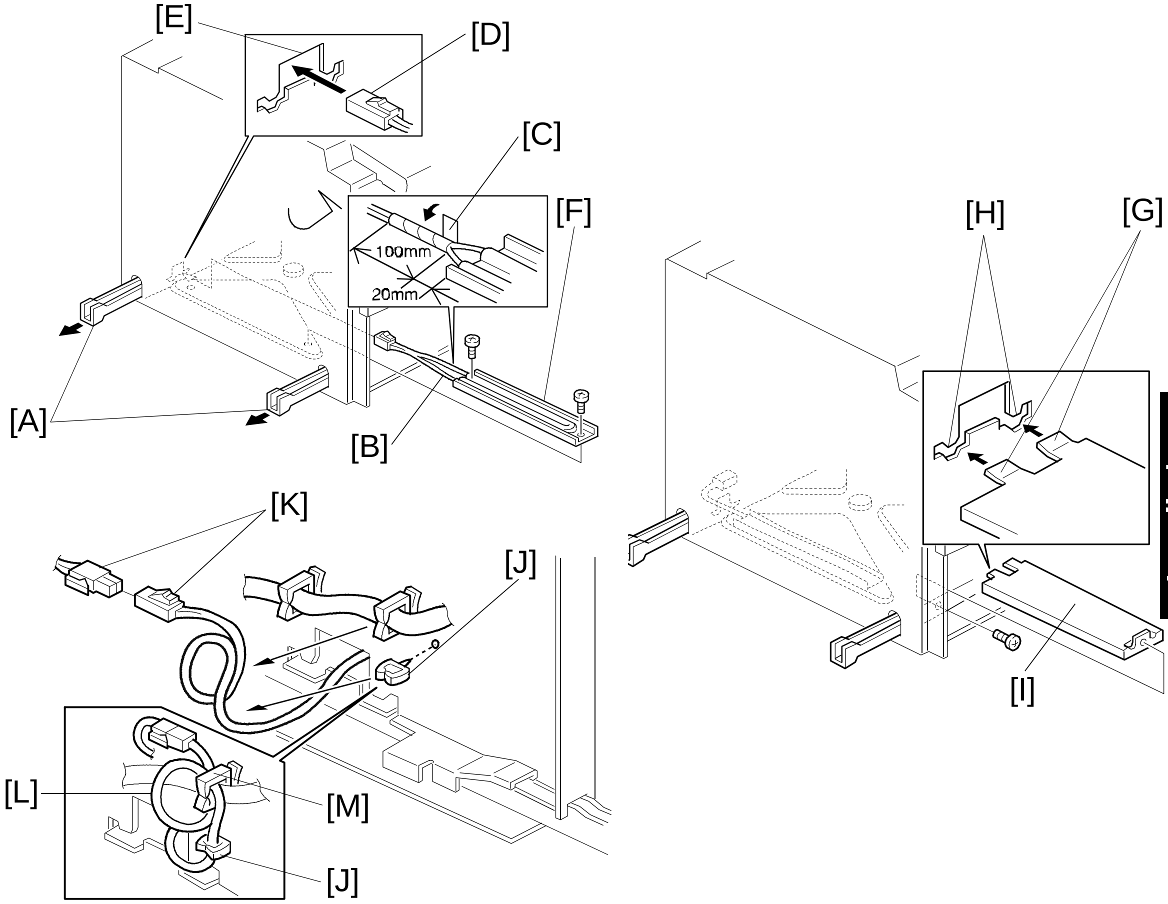




1. Remove the cover plate [A] (2 screws).
2. Remove the three plastic caps [B] from the copier left cover with nippers.
3. Install the sorter adapter [C] (4 tapping screws) in the paper exit section of the copier.
4. Attach the sorter adapter front cover [D] to the copier front cover (3 clips [E]) as shown.

   NOTE: Be sure to push the clips in completely.
5. Check that the rotation of the exit rollers [F] is synchronized with the rotation of the fusing unit knob [G].

2.5 TRAY HEATER INSTALLATION (OPTION)



NOTE: The optional tray heater keeps copy paper dry. In humid environments, copy paper may crease as it comes out of the fusing unit. The heater is available as a service part. (See the parts catalog.)

! CAUTION

Unplug the copier power cord before starting the following procedure.

If the 20 bin sorter stapler (A554) has been already installed, do step 1.

1. Remove the 20-bin sorter stapler and the sorter stapler mounting frame from the copier. (See "20-BIN SORTER STAPLER INSTALLATION PROCEDURE".)
2. **A153, A155, A157, and A159 copiers:** Remove the 1st and 2nd paper trays.
3. **A156 and A160 copiers:** Remove the duplex unit and the 1st paper tray.

4. Remove the rear cover. (See "Replacement and Adjustment - Inner and Outer Covers".)
5. Pull out the carrying handles [A].
6. Before installing the heater, bind the heater harness [B] with insulating tape [C] as shown to prevent the heater harness from being damaged by the edge of the copier main frame.
7. Pass the connector [D] through the opening [E] in the copier main frame.
8. Mount the heater [F] on the bottom of the copier main frame (2 screws).
9. Pass the two projections [G] through the opening [H] in the copier main frame, then mount the heater cover [I] on the bottom of the copier main frame (1 screw).

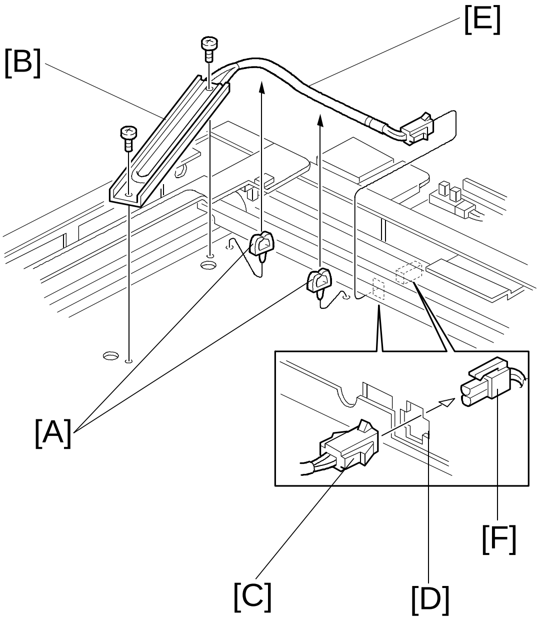
! CAUTION

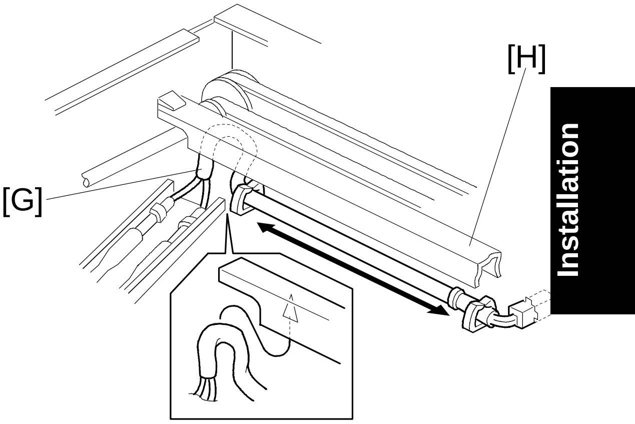
The heater cover is necessary, because the surface of the heater becomes very hot.

10. Insert the clamp [J] into the rear frame, and join the connectors [K].
11. Clamp the harness [L] to the two clamps [J] and [M] as shown to prevent the harness from touching the carrying handle.

    NOTE: Tell the customer that even when the copier main switch is turned off, the copier power cord should be plugged in. Otherwise, the tray heater will not function.

2.6 OPTICS ANTI-CONDENSATION HEATER (OPTION)





NOTE: The optics anti-condensation heater keeps water from condensing on the copier’s mirrors.
Such condensation occurs at cold temperatures with high humidity, and causes the first few copies of the day to be dark, or even black.
The heater is available as a service part. (See the parts catalog.)

! CAUTION

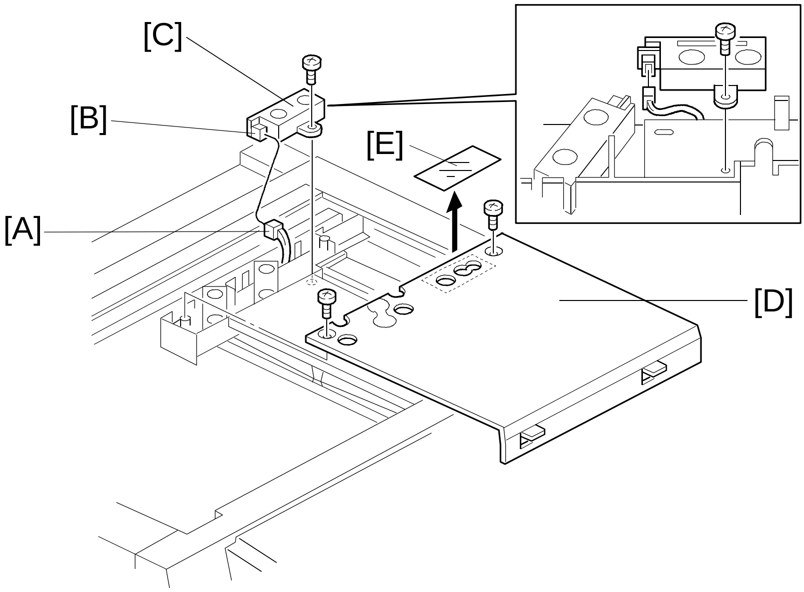
Unplug the copier power cord before starting the following procedure.

1. Remove the exposure glass. (See "Replacement and Adjustment - Exposure Glass Removal".)
2. Remove the rear cover. (See "Replacement and Adjustment - Outer Cover Removal".)
3. Insert the two clamps [A] as shown.
4. Mount the anti-condensation heater [B] (2 screws).
5. Pass the connector [C] through the opening [D].
6. Clamp the harness [E] to the two clamps [A].

7. Connect the **red** two-pin connector [F] at the rear of the copier to the heater's connector [C] (red).
8. Place the harness [G] under the optical rail [H] as shown.
9. Make sure that the scanner drive belt and mirrors do not touch the heater harness while they are functioning. Also, make sure that the heater harness does not interfere with the light path to the ADS sensor board.

NOTE: Tell the customer that even when the copier main switch is turned off, the copier power cord should be plugged in. Otherwise, the optics anti-condensation heater will not function.

2.7 ORIGINAL LENGTH SENSOR FOR APS (OPTION ONLY FOR THE LT/DLT VERSION)



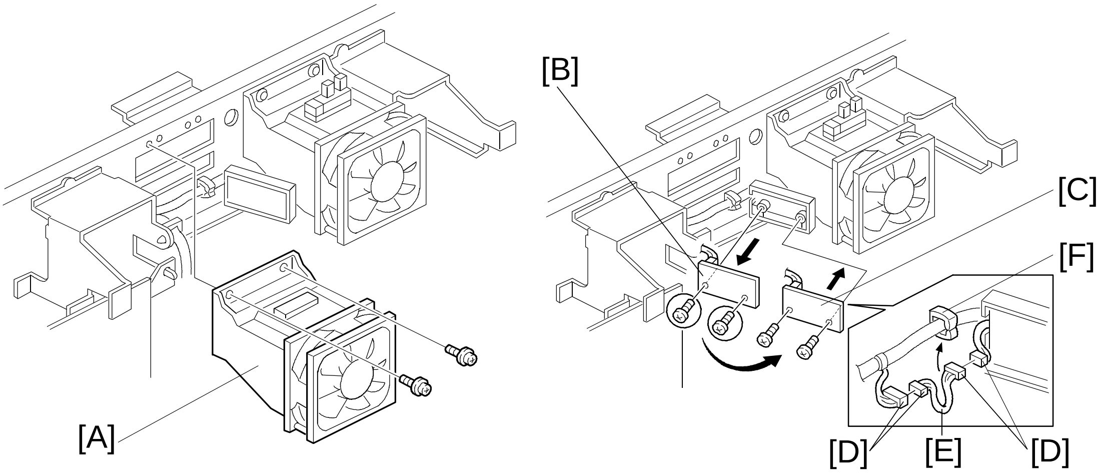
NOTE: To detect 11" x 15" size paper by APS in platen mode, an optional original length sensor is required. The sensor is available as a service part. (See the parts catalog.)

! CAUTION

Unplug the copier power cord before starting the following procedure.

1. Remove the exposure glass. (See "Replacement and Adjustment - Exposure Glass Removal".)
2. Remove the lens housing cover. (See "Replacement and Adjustment - Scanner Drive Belt Replacement".)
3. Pull out the light yellow connector [A] from under the optical rail.
4. Connect the light yellow connector [A] to the connector [B] of the optional sensor [C].
5. Mount the optional sensor [C] as shown (1 tapping screw).
6. Remount the lens housing cover [D] (2 tapping screws), and remove the light shielding mylar [E].
7. Enter SP mode, and input "1" as the SP4-302 setting. (See "Service Tables - Service Program Mode".)

2.8 ADS SENSOR (OPTION)



– A153, A155, and A156 copiers only –

NOTE: For originals written on some types of red paper, dirty background may occur in ADS mode. For customers who mainly use such types of red paper originals, an optional ADS sensor which has a different sensitivity for red originals is available as a service part. (See the parts catalog.)

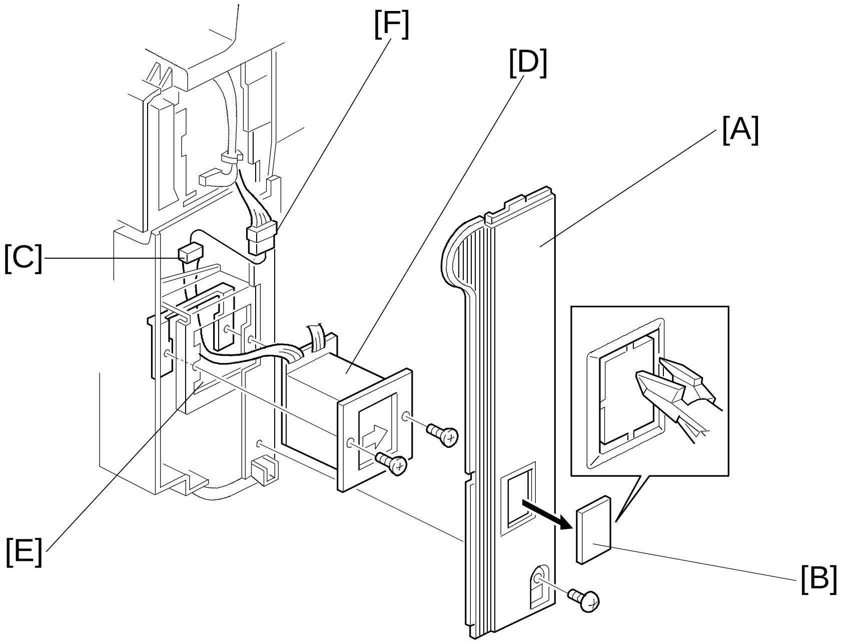
! CAUTION

Unplug the copier power cord before starting the following procedure.

1. **A153, A155, and A156 copiers only:** Remove the top cover. (See "Replacement and Adjustment - Outer Cover Removal".)
2. Remove the rear cover. (See "Replacement and Adjustment - Outer Cover Removal".)
3. **A153, A155, and A156 copiers only:** Remove the optics cooling fan duct [A] (2 tapping screws).
4. Remove the former ADS sensor board [B] (2 tapping screws and 1 connector).
5. Mount the optional ADS sensor board [C] (2 tapping screws) and connect the connectors [D] of the ADS sensor board to the adapter harness [E].
6. Clamp the harness [E] to the clamp [F] as shown.
7. Perform the ADS sensor initial setting with SP4-201. (See "Service Tables - Service Program Mode".)

NOTE: A153, A155, and A156 copiers only: When remounting the optics cooling fan duct [A], be sure not to catch the sensor harness.

2.9 KEY COUNTER HOLDER (OPTION)

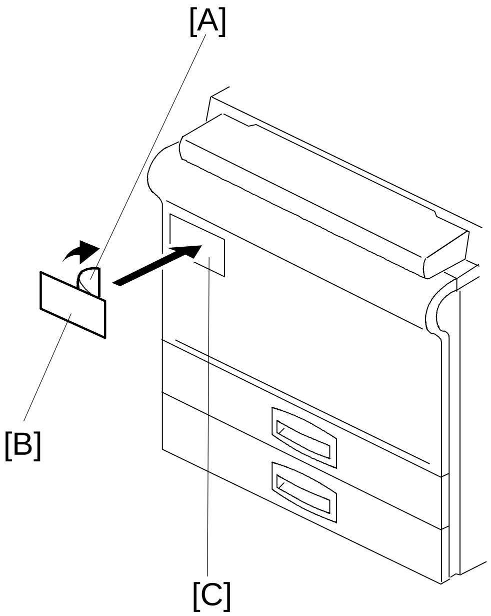


! CAUTION

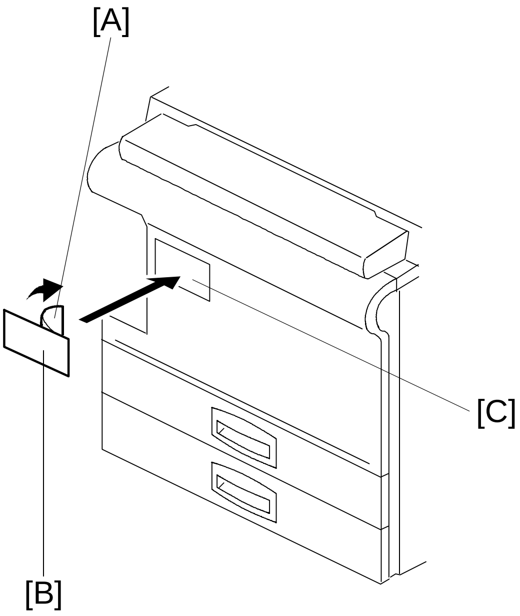
Unplug the copier power cord before starting the following procedure.

1. Remove the front right cover [A]. (See "Replacement and Adjustment - Outer Cover Removal".)
2. Remove the cap [B] with nippers.
3. Pass the four-pin connector [C] of the key counter holder [D] through the opening [E] and couple it with the key counter connector [F].
4. Mount the key counter holder [D] (2 screws).
5. Reinstall all the covers and check the key counter’s operation.
6. Make sure that SP mode 5-401 is set to 0, then switch the power off and cut JP2 on the main board.

2.10 BRAND DECAL APPLICATION INSTRUCTIONS (-10 AND -22 COPIERS ONLY)



A153, A155, and A156 Copiers



A157, A159, and A160 Copiers

1. Peel off the backing film [A].
2. Attach the brand decal [B] to the indent in the front cover [C] as shown.

SECTION 4

SERVICE TABLES

1. SERVICE REMARKS

1.1 HANDLING THE DRUM

The organic photoconductor (OPC) drum is comparatively more sensitive to light and ammonia gas than a selenium drum.

1. Never expose the drum to direct sunlight.
2. Never touch the drum surface with bare hands. When the drum surface is touched with fingers or becomes dirty, wipe it with a dry cloth or clean it with wet cotton. Wipe with a dry cloth after cleaning with wet cotton.
3. Never use alcohol to clean the drum; alcohol dissolves the drum surface.
4. Store the drum in a cool, dry place away from heat.
5. Take care not to scratch the drum as the photoconductive layer is thin and is easily damaged.
6. Never expose the drum to corrosive gases such as ammonia gas.
7. Always keep the drum in its protective sheet when it is out of the copier. Doing so avoids exposing the drum to bright light or direct sunlight. This will protect the drum from light fatigue.
8. Apply setting powder to the entire surface of the drum before installing a new drum.
9. Process control data initial setting (see section 3.1, "Practical SP Mode Use Tables - Replacement and Cleaning") must be performed when a new drum is installed.

1.2 DRUM UNIT

1. Make sure that the drum unit is set in position and the drum stay is secured with a screw when the main switch is turned on. If the drum unit is loose, poor contact of the drum connectors may cause electrical noise, resulting in unexpected malfunctions (RAM data may change in the worst case).
2. Insert a clean sheet of paper between the drum and the drum charge roller and also cover the OPC drum with paper when you leave the drum unit out of the copier more than 30 minutes. Doing so prevents the drum charge roller from sticking to the drum. If the drum charge roller sticks to the drum, the chemical component of the drum charge roller affects the surface of OPC drum.

1.3 DRUM CHARGE ROLLER

1. Do not touch the drum charge roller with bare hands. Oil stains may cause black bands on copies due to excessive drum charge.
2. Do not adhere toner or setting powder dust to the drum charge roller. Toner stains or setting power may cause white spots or white bands on copies due to insufficient drum charge.
3. Prevent the drum charge roller from being exposed to dusty air. Dust on the drum charge roller may cause white spots on copies due to insufficient drum charge.
4. Never use alcohol or water to clean the drum charge roller. Alcohol or water corrode the surface of the drum charge roller. Wipe with a dry cloth or a Dupont Sontara DY-12 cloth - P/N A1539004.
5. Reduce the drum charge roller cleaning intervals with SP2-901 as follows for users who mainly make high volume copy runs continuously.

SP2-901 setting	Cleaning interval
0	Every 1000 copies for 10 seconds [default]
1	Every 500 copies for 10 seconds
2	Every 200 copies for 10 seconds
3	Every 100 copies for 10 seconds

6. Plug in the copier power cord even when the copier main switch is turned off. While the main switch is turned off, the drum heater must be turned on to keep the temperature around the drum charge roller over 15°C. This prevents the drum charge efficiency from being low for the first copy after the power is switched on.

1.4 OPTICS

1. When installing the exposure glass, make sure that the mark on the edge of the glass faces up. This makes sure that the correct side faces up; this side has a smoother surface and generates less static electricity. This is especially important when the ARDF is installed.
2. When moving the 1st or 2nd scanners, always hold them at the center. Move them slowly, carefully, and gently. Abrupt movement may cause the belt to slip into the wrong position on the scanner drive pulleys.
3. Do not bend or crease the exposure lamp flat cable.
4. Do not touch the following parts with bare hands:
   a) Reflectors
   b) Exposure lamp
   c) Mirrors and lens
   d) ADS and V_L patterns under the left scale bracket
5. To clean the mirrors and lens, use only a clean soft cloth dampened with alcohol or water.
6. The mirror surface with the reflective coating must face the light path. The spring plates must contact the reverse side of the mirror (the side without the reflective coating).
7. If you ever adjust the exposure lamp voltage with SP4-001, be sure to perform auto ADS gain adjustment (SP4-201) and forced V_L detection (SP3-105) immediately afterwards. This is because ADS gain data and V_{REF} data will be cleared if SP4-001 is performed.

1.5 ERASE LAMP

1. A narrower lead edge erase margin increases the possibility of fusing jams. The margin should be at least 1.0 mm.
2. After cleaning the erase lamp unit, rub it lightly with your finger to discharge any static electricity on the surface.

1.6 DEVELOPMENT UNIT

1. Be careful not to nick or scratch the development roller sleeves.
2. Place the development unit on a sheet of paper after removing it from the copier. This prevents any small metal objects (staples, clips, E-rings, etc.) from being attracted to the development roller and getting inside the unit.
3. Clean the drive gears after removing the used developer.
4. Never load different types of developer or toner into the development unit. Doing so will cause poor copy quality and toner scattering inside the copier.
5. TD sensor initial setting (SP2-214) is necessary when new developer is loaded.
   Do not perform the TD sensor initial setting with used developer.
   Do not make any copy before TD sensor initial setting.
6. When removing the development unit, push it to the right to prevent the OPC drum from being scratched by part of the development unit.
7. The doctor gap and the development roller position must not be adjusted in the field as they are precisely adjusted at the factory using special tools. Do not loosen any screws except for those needed when removing the toner supply unit.
8. Before pulling out the development unit, disconnect the connector and release the development unit lock lever.
9. When putting the development unit back in the copier, do not forget to reconnect the connector.

1.7 TRANSFER BELT UNIT

1. Do not touch the transfer belt with bare hands.
2. When servicing the transfer belt cleaning unit, be careful not to damage the edge of the cleaning blade.
3. Apply setting powder to the transfer belt when installing a new transfer belt cleaning blade.
4. Dispose of the used toner inside the collection tank at every preventive maintenance. Never use the toner in the used toner collection tank for toner recycling.
5. Do not bend the bias terminal at the rear side of the transfer belt unit. A bent terminal may cause a bad contact for the transfer charge circuit.

1.8 CLEANING SECTION IN THE DRUM UNIT

1. When servicing the cleaning section, be careful not to damage the edge of the cleaning blade.
2. Apply setting powder to the surface of the drum when installing a new cleaning blade. Otherwise, the cleaning blade catches the drum, and both the cleaning blade and the drum will be damaged.

1.9 ERASE LAMP/PTL/QUENCHING LAMP

1. Place a sheet of paper over the transfer belt unit when removing the erase lamp, the pre-transfer lamp (PTL), or the quenching lamp. Doing so prevents these lamps from damaging the transfer belt if they fall down by mistake.

1.10 PAPER FEED

1. Do not touch the pick-up, feed, separation rollers, or the friction pads with bare hands.
2. The side fences and the rear fence of the paper trays should be positioned correctly in alignment with the actual paper size. Otherwise, paper misfeeds may occur.
3. When using by-pass feed while placing the original directly on the exposure glass, be sure to lower the platen cover or document feeder before pressing the Start key. For the first copy using by-pass feed, the copier scans full size. If the platen cover is opened, a completely black image is developed on the drum outside the copy paper size. This black image is transferred not to the copy paper but to the transfer belt. The toner transferred to the transfer belt cannot be cleaned off completely by the cleaning blade. This may cause the back of the next sheet of copy paper to be dirty.
4. When using by-pass feed, stop pushing the sheets of copy paper at the moment that the paper end indicator turns off. If you do not do so, all the sheets of paper get under the feed roller, causing a jam.
5. **A157, A159, and A160 only:** For users who mainly use B size paper, change the paper feed roller position to the B size paper position when paper jams or non-feeds occur. (See Replacement and Adjustment - Section 6.5 Paper Feed Roller Replacement for A157/A159/A160.) This remark also applies to the A553 paper tray unit.

6. Avoid storing paper in humid areas.
   At high temperature and high humidity, or at low temperature and low humidity, store paper in a plastic bag. This is especially important when a sorter stapler is installed.

7. Load the paper in the paper trays, LCT, and by-pass feed table the correct way up as indicated on the copy paper package.
   If heavy curl occurs with a paper type which has no such indication on the package, try turning the paper stack over. Change the paper if the heavy curl cannot be corrected in spite of this. This is especially important when a sorter stapler is installed.

   NOTE: Proper paper loading is as follows;

   1) For the paper trays of the copier and the paper tray unit, the paper must be copy side down.
   2) For the by-pass feed table and the LCT, the paper must be copy side up.

8. Do not leave paper or originals on top of the LCT. Any paper left there may be fed into the copier and damaged.

1.11 FUSING UNIT

1. Be careful not to damage the edges of the hot roller strippers or their tension springs.

2. Do not touch the fusing lamps with bare hands.

3. Make sure that the fusing lamps are positioned correctly and that they do not touch the inner surface of the hot roller.

1.12 OTHERS

1. Never touch the surface of the RAM back up battery on the main board with screwdrivers or other metallic objects.
   If the battery is short-circuited, RAM data will be destroyed in the worst case.

2. When carrying the copier, never lift it up by holding the LCT. Otherwise, the LCT will be broken. Hold the copier by the carrier handles in the bottom corners.

2. SERVICE PROGRAM MODE

2.1 SERVICE PROGRAM MODE OPERATION

The service program (SP) mode is used to check electrical data, change modes, and adjust settings.

2.1.1 Service Program Mode Access Procedure

How to enter the SP mode

Press the following keys in sequence.

[Ⓒ/♨] → [1] → [0] → [7] → [C/⊽]

NOTE: 1. The above procedure must be finished within 20 seconds.

2. Hold the final [C/⊽] key for more than 3 seconds .
3. When SP mode is selected , "1" blinks in the 3rd digit of the copy counter, the Auto Image Density indicator starts blinking, and the reduce/enlarge indicator turns off.

How to leave the SP mode

Press the [Ⓒ/♨] key three times,

or turn off the main switch.

NOTE: The above procedure must be finished within 20 seconds.

How to select the program number

Program numbers are composed of two or three levels.

□ – □□□ – □□□

1st Level Program Number	2nd Level Program Number	3rd Level Program Number

To input the required program number, select each program level in sequence.

1. Select the 1st level and 2nd level program numbers at the numeric keys. Then press the R/# key.
2. **If there are third level programs in this SP mode:** Select the 3rd level program number by pressing the + and − keys. The 3rd level program number is displayed in the copy counter. Then press the R/# key.
   If there are no third level programs in this SP mode: Do not press the +, −, or R/# keys at this time.
   Note: If you need to return to one level before, press the C/⊘ key.
3. Input the required setting as explained in the following section.

2.1.2 Changing the Value of an SP Mode

1. Enter the SP mode.
2. Select the required program mode as explained above.
3. The current setting will be displayed in the reduce/enlarge indicator.
4. Enter the required setting using the numeric keys, then press the R/# key. (SP mode numbers and their possible settings are given in the SP mode table.)
5. Leave SP mode.

2.2 MEMORY RESET PROCEDURES

Before starting a memory reset procedure, be sure to remember the following:

For SP3-123, SP7-804, SP7-808, SP7-810, and SP7-811, be sure to check again whether you really wish to use this SP mode before you press the R/# key. If the R/# key is pressed after entering one of these modes, the memory will be reset.

For example, to enter SP Mode 7-804

7 → R/# → 8 0 4 → Check the SP Number again → R/#

2.2.1 Resetting Counters

To reset a counter, use any of the following SP modes.
SP7-804, SP7-810, SP7-811: Before pressing the final R/# key, make sure that this is the SP mode that you really wish to use.

SP Mode Number	Counter to be Reset	To Check the Counter
SP5-404-001	Selected User Code Counter	SP5-402
SP5-404-002	All User Code Counters	
SP7-804	PM Counter	SP7-803
SP7-807-001	Total Service Call Counters	SP7-401 SP7-402
SP7-807-002	Total Copy Paper Misfeed Counters	SP7-502 SP7-504
SP7-807-003	Total Original Misfeed Counters	SP7-503 SP7-505
SP7-810	Copy Counters	SP7-002 SP7-101 SP7-301
SP7-811	DF Original Counter	SP7-205
SP7-816-001	Total sheets of paper fed from the Upper Tray (Except for A156 and A160 copiers)	SP7-204-001
SP7-816-002	Total sheets of paper fed from the Lower Tray	SP7-204-002
SP7-816-003	Total sheets of paper fed from the 1st Tray of the Paper Tray Unit	SP7-204-003
SP7-816-004	Total sheets of paper fed from the 2nd Tray of the Paper Tray Unit	SP7-204-004
SP7-816-005	Total sheets of paper fed from the 3rd Tray of the Paper Tray Unit	SP7-204-005
SP7-816-006	Total sheets of paper fed from the LCT	SP7-204-006
SP7-816-007	Total sheets of paper fed from the By-pass Feed Table	SP7-204-007
SP7-816-008	Total Duplex Paper Feeds	SP7-204-008

1. Enter the required SP mode. **(Do not press R/# after entering this SP mode until you are sure that you want to reset the counters.**)

   NOTE: Before pressing the R/# key, be sure to check again whether you have selected the correct SP mode number or not.

2. Press the R/# key, then the selected counter will be reset.

2.2.2 Reset All Counters: SP7-808

This SP mode resets the following counters:

Counter to be Reset	Counter check
Operation Time	SP7-001
Total Original Scan Counter	SP7-002
Copy Counters by Paper Size	SP7-101
Total Sheets of Paper fed from the Paper Trays	SP7-204
DF Original Counter	SP7-205
Stapler Counter	SP7-206
Reduction/Enlargement/Full Size Copy Counters	SP7-301
Total Service Call Counter	SP7-401
Individual Service Call Counters	SP7-402
Total Jam Counter	SP7-501
Total Copy Jam Counter	SP7-502
Total Original Jam Counter	SP7-503
Copy Jam Counters for Each Location	SP7-504
Original Jam Counters for Each Location	SP7-505
PM Counter	SP7-803

1. Enter SP7-808. **(Do not press the R/# key after entering this SP mode until you are sure that you want to reset the counters.)**

   NOTE: Before pressing the R/# key, be sure to check again whether you wish to reset these counters or not.

2. Press the R/# key. The above counters are all reset.

2.2.3 Drum Initialization: SP3-123

CAUTION: If SP3-123 is performed, the V_R, V_L, and T/H correction levels and the drum rotation timer are reset. As a result, the old drum cannot be used any more.
If the old drum is used after SP3-123 is performed, dirty background and/or toner scattering will appear on copies sooner or later because proper process control will not be applied to the drum.
When installing a new drum, do the following procedure make sure that the machine returns to its normal operating condition.

1. Install a new OPC drum.
2. Clean the optics, sensors, and inside the copier if necessary.
3. Do SP 3-123 as follows.
   - 3-1. Enter SP3-123. **(Do not press the R/# key after entering this SP mode until you are sure you want to initialize the drum data.)**
   - 3-2. Press the R/# key. The drum data will be initialized.
4. Perform the following SP modes in the following order (see "Practical SP Mode Use Tables" for details):
   - (1) SP3-001: ID Sensor Initial Setting
   - (2) SP3-112: Forced V_R Detection
   - (3) SP4-001: Exposure Lamp Voltage Adjustment
   - (4) SP4-201: Auto ADS Gain Adjustment
   - (5) SP3-105: Forced V_L Detection
5. Check the copy quality and the paper path and do any necessary adjustments (see Replacement and Adjustment - Copy Quality Adjustments).

2.2.4 Reset All Memory (SP5-801)

CAUTION: Reset All Memory mode (SP5-801) resets all the correction data for copy process control and all the software counters, and returns all modes and adjustments to the default settings.

Normally, this SP mode should not be performed.
This procedure is required only when replacing the RAM board or when the copier malfunctions due to a damaged RAM board.

- Memory reset procedure -

1. Enter SP5-801.
2. Press the R/# key and the • key at the same time.

   NOTE: To avoid resetting the memory by mistake, this mode is done only when the R/# key and the • key are pressed at the same time.

3. Turn the main switch off and on.

- Recovering the machine after a memory reset -

CAUTION: If SP5-801 is performed, the drum rotation timer for process control and the TD sensor initial setting data are reset. As a result, the old drum and the old developer cannot be used any more. Otherwise, dirty background and/or toner scattering will appear on copies sooner or later because proper process control will not be applied to the drum.
After doing SP5-801, execute the following procedure to return the machine to its normal operating condition.

1. Install a new OPC drum.
2. Install new developer.
3. Clean the optics, sensors, and inside the copier if necessary.

4. Refer to the "SP MODE FACTORY SETTING DATA" sheet located in the upper inner cover and enter the data that were stored in the following SP modes at the factory.
   - SP1-001: Registration Adjustment
   - SP2-001: Drum Charge Roller Voltage (for Copying)
   - SP2-003: Drum Charge Roller Voltage (for V_{SP} Pattern)
   - SP2-101-001: Lead Edge Erase Margin
   - SP4-001: Exposure Lamp Voltage Adjustment
   - SP4-008: Vertical Magnification Adjustment
   - SP4-011-008: Base Horizontal H.P. Adjustment
   - SP4-101: Horizontal Magnification Adjustment
   - SP4-102: Lens Error Correction
   - SP4-103: Focus Adjustment

5. Perform the following SP modes in the following order (see "Practical SP Mode Use Tables" for details):
   (1) SP2-214: TD Sensor Initial Setting
   (2) SP3-123: Drum Initialization
   (3) SP3-001: ID Sensor Initial Setting
   (4) SP3-112: Forced V_R Detection
   (5) SP4-001: Exposure Lamp Voltage Adjustment
   (6) SP4-201: Auto ADS Gain Adjustment
   (7) SP3-105: Forced V_L Detection

6. Check the copy quality and the paper path and do any necessary adjustments (see Replacement and Adjustment - Copy Quality Adjustments).

2.3 SERVICE PROGRAM MODE TABLE

1. A "†" after the mode name means that copies can be made while in this SP mode.
2. A "‡" after the default setting in the "Settings" column means that the actual factory setting for this is written on the data sheet in the front cover.
3. A "°" before the mode number means that this mode can be accessed by sales representatives (◇/♨ → C/▽ → ◇/♨ → C/▽).
4. A "•" before the mode number means that this mode can be accessed by users using a UP mode (◇/♨ → C/▽). See "UP Mode/SP Mode Cross Reference Table".
5. In the Function column, comments (extra information) are in italics.
6. In the Settings column, the default values are printed in bold letters.
7. "RDS" means Remote Diagnostic System (not available in these models)
   "CSS" means Customer Support System (only available in Japan)
8. Type 1 = A153, A155, and A156 copiers
   Type 2 = A157, A159, and A160 copiers

2.3.1 Quick Reference

The following is a quick reference list of the SP Modes.

Mode No.	Function
Paper Feed/Paper Transport/Fusing	
1-001	Registration †
1-003-xxx	Paper Feed Timing †
1-008	Misfeed Detection †
1-103	Fusing Idling †
°1-104	Fusing Temperature Control †
1-105-xxx	Fusing Temperature Adjustments †
1-106	Fusing Temperature Display †
1-108	Forced Start †
1-902	Jogger Span Adjustment (Side Fence) †
1-905	Jogger Span Adjustment (End Fence) †
Around the Drum	
2-001	Drum Charge Voltage Adjustment (for copying)
2-002-xxx	Drum Charge Voltage Display †
2-003	Drum Charge Voltage Adjustment (for making VSP patterns)
2-101-xxx	Leading/Trailing Edge Erase Margin Adjustment †

Mode No.	Function
2-201-xxx	Development Bias Adjustments †
2-203	Development Bias Adjustment (for making V_{SP} patterns)
2-206-xxx	Development Bias Display †
2-207	Forced Toner Supply (shown as "Compulsory Toner Supply" on the display)
2-208-001	Toner Supply Mode Selection †
2-208-002	Toner Supply Ratio (TD Sensor Supply Mode) †
2-208-003	Toner Supply Ratio (Fixed Supply Mode) †
2-214	TD Sensor Initial Setting
2-215-xxx	TD Sensor Output Display †
2-220	TD Sensor Initial Output Display †
2-222	Toner Supply Ratio (Detect Supply Mode) †
2-301-xxx	Transfer Current Adjustments † Factory Use Only: Do not change the settings.
2-801	Developer Agitation
2-802	Drum Charge Roller Temperature †
2-812	Drum Reverse Rotation Adjustment †
2-901	Drum Charge Roller Cleaning Interval †
2-902	Development Unit Initial Setting
Process Control	
3-001	ID Sensor Initial Setting
3-002	ID Sensor Initial Setting Display †
3-103-xxx	ID Sensor Output Display †
3-105	Forced V_L Detection
3-106	Initial V_{LP}/V_{LG} Display †
3-107	Current V_{LP}/V_{LG} Display †
3-111	Current V_{RP}/V_{RG} Display †
3-112	Forced V_R Detection
3-123	Drum Initialize
3-801	Auto Process Control Mode Selection †
3-901	Free Run (Exposure Lamp Off)
3-902	Forced Process Control
Optics	
4-001	Exposure Lamp Voltage Adjustment †
°4-002	Exposure Lamp Voltage Display †
4-008	Vertical Magnification Adjustment †
4-011-xxx	Lens Horizontal H.P. Adjustments †
4-013	Scanner Free Run
4-101	Horizontal Magnification Adjustment †
4-102	Lens Error Correction †
4-103	Focus Adjustment †

Mode No.	Function
4-201	Auto ADS Gain Adjustment
4-202	ADS Initial Gain Display †
4-203	ADS Actual Gain Display †
4-301	APS Sensor Function Check †
4-302	Optional APS Sensor **(LT version only)** †
4-303	APS A5/HLT Detection †
4-901	APS Size Priority (for F4 size) †
•°4-902	APS 8K/16K Detection **(A4 versions only)** †
Operation	
•°5-001	All Indicators ON †
•°5-002	Feed Station Priority Selection †
•°5-003	APS Priority Selection †
•°5-004	ADS Priority Selection †
•°5-013	Counter Up/Down Selection †
•°5-017	Maximum Copy Quantity † (Copy Limit)
•°5-019-xxx	Paper Size Set †
•°5-101	Auto Reset Time Setting †
•°5-102	Auto Energy Saver Time Setting †
•°5-103	Auto Tray Shift †
°5-104	A3/DLT Double Count †
•°5-106	Image Density Level Correction (ADS Correction) †
•°5-107-xxx	Image Shift Margin Adjustment †
•°5-108	Edge Erase Margin Adjustment †
•°5-110	Center Erase Margin Adjustment †
°5-113	Coin Lock Installation †
5-115	Duplex Image Shift (Back Side Margin) †
°5-121	T/C (Total Counter) Count Up Timing †
•°5-305	Auto Off Time Setting †
°5-401	User Code Mode †
•°5-402	User Code Counter Check †
•°5-404-xxx	User Code Counter Clear †
•°5-405	User Code Number Setting †
•°5-407-xxx	User Code Number Clear †
°5-408	Number of Registered User Codes Display †
°5-501-001	PM Interval Setting †
°5-501-002	PM Interval Setting (PM Alarm Mode Setting) †
5-504	Used in Japan only. Do not change the factory setting.
5-505	Used in Japan only. Do not change the factory setting.
°5-507	Used in Japan only. Do not change the factory setting.
5-801	Memory All Clear †

Mode No.	Function
5-802-xxx	Free Run Mode
5-803	Input Check Mode †
5-804	Output Check Mode
°5-810	SC Reset †
5-811	Used in Japan only. Do not change the factory setting.
°5-812	Telephone Number Input † **(A156 copier only)**
°5-816	Used in Japan only. Do not change the factory setting.
5-817	Used in Japan only. Do not change the factory setting.
°5-905	APS A4/LT Sideways Priority †
•°5-906	Manual Staple Reset Time Setting †
•°5-907	Cover Mode Selection †
•°5-908	Image Shift/Erase Selection †
•°5-909	10 key Zoom/Size Magnification †
°5-910	Guidance Language Setting **(A156 copier only)** †
Peripherals	
•°6-001	SADF Auto Reset Time Setting †
•°6-002	ADF Free Size Setting †
°6-003	Auto Sort Selection †
°6-005	Blank Copy for Last Odd Originals in Duplex †
6-006-xxx	DF Registration Adjustment †
6-009	DF Free Run with Paper
•°6-010	Auto APS Select (DF) †
•°6-011	Thick/Thin Original Mode Selection †
°6-101	Sorter Installation †
°6-102	Sorter Stack Limit †
°6-104	Staple Sheet Limit †
6-107	Sorter Free Run Mode
Counters	
°7-001	Total Operation Time Display †
°7-002	Total Original Counter Display †
°7-003	Copy Charge Counter for RDS/CSS Display † This is for use with features that are available only in Japan. However, it does show how many originals have been copied (total of DF mode + platen mode).
°7-004	Initial Copy Counter Setting for RDS/CSS Display † This is for use with features that are available only in Japan. However, it does show the total number of copies that have been made.
°7-101-xxx	Total Copies by Paper Size †
°7-203	Drum Counter †
°7-204-xxx	Feed Unit Counter †
°7-205	DF Counter †

Mode No.	Function
°7-206	Stapler Counter †
°7-301-xxx	Total Copies by Magnification †
°7-401	Total Service Call Counter †
°7-402	SC Counter by Service Call †
°7-501	Total Jam Counter † (Copies + Originals)
°7-502	Total Jams by Paper Size † (**Note:** This is actually the Total Copy Paper Jam Counter. The counter is not divided up by Paper Size)
°7-503	Total Original Jam Counter
°7-504-xxx	Total Jams by Location †
°7-505-xxx	Total Original Jams by Location †
°7-801-xxx	Main ROM Version Display †
°7-803	PM Counter Check †
°7-804	PM Counter Clear
°7-807-001	SC Counter Clear †
°7-807-002	Copy Jam Counter Reset †
°7-807-003	Original Jam Counter Reset †
°7-808	Counter All Clear
°7-810	Copy Counter Clear
°7-811	DF Counter Clear
°7-816-xxx	Feed Unit Counter Clear †

2.3.2 SP Mode Table

<table>
<tr><th colspan="2">Mode No.</th><th>Function</th><th>Settings</th></tr>
<tr><td rowspan="2">1-001</td><td rowspan="2">Registration †</td><td>Adjusts leading edge registration.</td><td rowspan="2">0 ~ 32
Default = 16 ‡</td></tr>
<tr><td><i>(0.5 mm per step [range: –8.0 mm to +8.0 mm])</i></td></tr>
<tr><td rowspan="2">1-003-001
to
1-003-008</td><td rowspan="2">Paper Feed Timing †</td><td>Adjusts the paper feed timing at registration for each paper feed station. Paper feed timing is in proportion to the amount of paper bending [mm] at registration.</td><td rowspan="2">0 ~ 32
Default = 16

SP1-003-008: Do not adjust this setting.</td></tr>
<tr><td><i>(1 mm per step [range: –16 mm to + 16 mm])</i>
<table>
<tr><th>SP Number</th><th>Without Duplex</th><th>With Duplex</th></tr>
<tr><td>SP1-003-001</td><td>1st tray</td><td>Duplex</td></tr>
<tr><td>SP1-003-002</td><td>2nd tray</td><td>1st tray</td></tr>
<tr><td>SP1-003-003</td><td>3rd tray</td><td>2nd tray</td></tr>
<tr><td>SP1-003-004</td><td>4th tray</td><td>3rd tray</td></tr>
<tr><td>SP1-003-005</td><td>5th tray</td><td>4th tray</td></tr>
<tr><td>SP1-003-006</td><td>By-pass</td><td>By-pass</td></tr>
<tr><td>SP1-003-007</td><td>LCT</td><td>LCT</td></tr>
<tr><td>SP1-003-008</td><td colspan="2">Japan only</td></tr>
</table></td></tr>
<tr><td>1-008</td><td>Misfeed Detection †</td><td>Switches misfeed detection on or off for test purposes (sensor signals are ignored). Only one copy can be made at a time, to prevent damage to the machine.</td><td>0: OFF
1: ON</td></tr>
<tr><td rowspan="2">1-103</td><td rowspan="2">Fusing Idling †</td><td>Selects whether fusing idling is done or not. Fusing idling lasts 2 minutes.</td><td rowspan="2">0: OFF
1: ON</td></tr>
<tr><td><i>After selecting ON or OFF, turn the main switch off and on.</i></td></tr>
<tr><td rowspan="2">°1-104</td><td rowspan="2">Fusing Temperature Control †</td><td>Selects the fusing lamp temperature control mode.</td><td rowspan="2">0: On/Off Control
1: Phase Control</td></tr>
<tr><td><i>After selecting the control mode, turn the main switch off and on.</i></td></tr>
<tr><td rowspan="2">1-105-001</td><td rowspan="2">Fusing Temperature Adjustment (Main Fusing Lamp) †</td><td>Adjusts the temperature of the main fusing lamp, which heats the central area of the hot roller.
The selected temperature is displayed in the reduce/enlarge indicator.</td><td rowspan="2">170 ~ 190
Default = 180
(Type 1)
Default = 175
(Type 2)</td></tr>
<tr><td>(1°C per step [range: 170°C to 190°C])</td></tr>
</table>

<table>
<tr><th colspan="2">Mode No.</th><th>Function</th><th>Settings</th></tr>
<tr><td>1-105-002</td><td>Fusing Temperature Adjustment for Energy Saver Mode †</td><td>Adjusts the temperature of the main and secondary fusing lamps in energy saver mode.
(SP5-102 and SP5-305 are also related to Energy Saver Mode.)
<table><tr><th>SP Data</th><th>Type 1</th><th>Type 2</th></tr><tr><td>0</td><td>175°C</td><td>175°C</td></tr><tr><td>1</td><td>160°C</td><td>150°C</td></tr><tr><td>2</td><td>145°C</td><td>125°C</td></tr><tr><td>3</td><td>130°C</td><td>100°C</td></tr><tr><td>4</td><td>115°C</td><td>75°C</td></tr><tr><td>5</td><td>95°C</td><td>—</td></tr></table>
The lower the fusing temperature is, the greater the energy saving ratio is and the longer the waiting time until the copier returns to the ready condition.</td><td>0 ~ 5
(Type 1)
0 ~ 4
(Type 2)
Default = 0</td></tr>
<tr><td>1-105-003</td><td>Fusing Temperature Adjustment (Secondary Fusing Lamp) †</td><td>Adjusts the temperature of the secondary fusing lamp, which heats both ends of the hot roller.
(1°C per step [range: 160°C to 190°C])</td><td>160 ~ 190
Default = 175</td></tr>
<tr><td>1-106</td><td>Fusing Temperature Display †</td><td>Displays the fusing temperature (°C) on the surface of the central area of the hot roller, as measured by the thermistor.
The temperature in energy saving mode cannot be displayed, as entering SP mode takes the machine out of this mode.</td><td></td></tr>
<tr><td>1-108</td><td>Forced Start †</td><td>Selects whether forced start is on or off.
If forced start is switched on, the copier enters the ready condition even if the fusing temperature has not reached the required value yet. Use this for tests if the room temperature is low and you do not wish to wait for the lamps to warm up.</td><td>**0: OFF**
1: ON</td></tr>
<tr><td>1-902</td><td>Jogger Span Adjustment (Side Fence) †</td><td>Adjusts the stop position of the jogger side fence span of the duplex unit.
(0.5 mm per step [range: –8.0 mm to +8.0 mm])
A156 and A160 copiers only</td><td>0 ~ 32
Default = 16</td></tr>
<tr><td>1-905</td><td>Jogger Span Adjustment (End Fence) †</td><td>Adjusts the stop position of the jogger end fence span of the duplex unit.
(0.5 mm per step [range: –8.0 mm to +8.0 mm])
A156 and A160 copiers only</td><td>0 ~ 32
Default = 16</td></tr>
</table>

Mode No.		Function	Settings
2-001	Drum Charge Voltage Adjustment (for copying) †	Adjusts the voltage applied to the drum charge roller during copying. *The adjustment factor set with this SP mode is added to the base voltage.* *(30 V per step [Range: Base voltage - 480 V to Base voltage + 480 V]*	0 - 32 **Default: 16 (0V)** ‡
2-002-001 to 2-002-002	Drum Charge Voltage Display †	Displays the voltage applied to the drum charge roller. SP2-002-001: For copying SP2-002-002: For making VSP patterns *The first three digits are displayed in the reduce/enlarge indicator. The actual value is the displayed value x (–10) V.* *Just after the main switch is turned on, the initial setting voltage is displayed. After one or more copies, the actual applied voltage (including the process control corrections) is displayed.*	
2-003	Drum Charge Voltage Adjustment (for making VSP patterns) †	Adjusts the voltage applied to the drum charge roller when making VSP patterns. *The adjustment factor set with this SP mode is added to the base voltage.* *(10 V per step [Range: Base voltage –160 V to Base voltage + 160 V]*	0 - 32 **Default: 16 (0V)** ‡
2-101-001 to 2-101-002	Leading/Trailing Edge Erase Margin Adjustment †	Adjusts the leading and trailing edge erase margins. SP2-101-001: Leading edge erase margin SP2-101-002: Trailing edge erase margin *(0.5 mm per step [range: 0.0 mm to +16.0 mm])*	0 - 32 **Default = 16** ‡ (only 2-101-001 is on the data sheet)
2-201-001	Development Bias Adjustment (for copying) †	Adjusts the development bias for copying to make copies lighter or darker in general. *The adjustment factor set with this SP mode is applied to the base voltage.* *(20 V per step [Range: Base voltage –80 V to Base voltage +80 V])*	1 - 9 **Default = 5 (0V)** 1: Darkest 9: Lightest
2-201-002	Lightest ID Level Development Bias Adjustment †	Adjusts the development bias for manual ID level 7. *The adjustment factor set with this SP mode is applied to the base voltage when ID level 7 is selected.*	**1: –40 V** 2: ±0 V 3: –80 V 4: –120 V
2-203	Development Bias Adjustment (for making VSP patterns) †	Adjusts the development bias for making VSP patterns *The adjustment factor set with this SP mode is added to the base voltage.* *(20 V per step [Range: Base voltage - 10 V to Base voltage + 80 V]*	1 - 10 **Default = 6 (0V)**

Mode No.		Function	Settings
2-206-001 to 2-206-002	Development Bias Display †	Displays the development bias. SP2-206-001: Development bias used for copying. SP2-206-002: Development bias used for making V_{SP} sensor patterns.	
		The first two digits are displayed in the reduce/enlarge indicator. The actual value is: displayed value x (–10) V. All process control corrections are included in the displayed value.	
2-207	Forced Toner Supply (shown as "Compulsory Toner Supply" on the display)	Forces the toner bottle to supply toner to the toner supply unit for 30 seconds.	
		This mode is started by pressing the "Start" key and stops automatically after about 30 seconds. Press the"Clear Modes" key to interrupt if necessary. This SP mode must be performed twice when installing the machine and when installing a new toner supply unit.	
2-208-001	Toner Supply Mode Selection †	Selects the toner supply mode. In many cases, the machine will change the toner supply mode automatically if either the TD or ID sensor become unreliable. However, sometimes it does not. If the TD sensor fails, you can select fixed supply mode as a temporary measure. If the ID sensor fails, you can select TD sensor supply mode. After repairing the machine, check whether the toner supply mode has gone back to the detect supply mode.	1: TD sensor supply mode 2: Fixed supply mode **3: Detect supply mode**
2-208-002	Toner Supply Ratio (TD Sensor Supply Mode) †	Selects the toner supply ratio for TD sensor supply mode. For example, if the user normally makes copies of originals that are about 7% black, select the 7% setting for best results.	1: 7% **2: 15%** 3: 30% 4: 60%
2-208-003	Toner Supply Ratio (Fixed Supply Mode) †	Selects the toner supply ratio for Fixed Supply Mode. For example, if the user normally makes copies of originals that are about 6% black, select the 6% setting for best results.	1: 2% 2: 4% **3: 6%** 4: 11%

Mode No.		Function	Settings
2-214	TD Sensor Initial Setting	Performs the TD sensor initial setting. This SP mode controls the voltage applied to the TD sensor to make the TD sensor output 2.5 ± 0.1 V. After using SP2-214, check SP2-220 to see if the sensor is working correctly. *This mode is started by pressing the Start key and stops automatically after about 2.5 minutes. Use this mode only after adding new developer.*	
2-215-001 to 2-215-002	TD Sensor Output Display †	Displays the TD sensor output voltage. SP2-215-001: VT = Current TD sensor output SP2-215-002: VTREF = Reference TD sensor output	
2-220	TD Sensor Initial Output Display †	Displays the TD sensor initial setting output (after doing SP2-214). *Normally, 2.5 ± 0.1 V is displayed. [Range: 0 V to 5.0 V]* *If it is not, the sensor may be defective.*	
2-222	Toner Supply Ratio (Detect Supply Mode) †	Selects the toner supply ratio for detect supply mode. For example, if the user normally makes copies of originals that are about 7% black, select the 7% setting for best results.	1: 7% **2: 15%** 3: 30% 4: 60%
2-301-001 to 2-301-002	Transfer Current Adjustments † Factory Use Only: Do not change the settings.		0 ~ 32 **14 (–30 μA): Type 1** **12 (–20 μA): Type 2**
2-801	Developer Agitation	After the Start key is pressed, the developer is agitated. To stop, press the "Clear Stop" key. *Use this SP mode if the machine has not been used for a long time.*	
2-802	Drum Charge Roller Temperature †	Displays the drum charge roller temperature [0 ~ 60°C].	
2-812	Drum Reverse Rotation Adjustment †	Adjusts the amount of the time for the drum reverse rotation after each copy job. *If paper dust remains on the drum, it may get into the recycled toner. If this is happening, increase the reverse rotation by increasing the value of the setting.*	0 ~ 32 **Default = 16 (about 3 mm)**

Mode No.		Function	Settings
2-901	Drum Charge Roller Cleaning Interval †	Selects the drum charge roller cleaning interval. Turn the copier main switch off and on after changing the setting. *The drum charge roller is cleaned briefly at the end of each copy job. The drum charge roller is also cleaned for 10 seconds after the interval selected with this SP mode.*	**0: Every 1000 copies** 1: Every 500 copies 2: Every 200 copies 3: Every 100 copies
2-902	Development Unit Initial Setting	Performs TD sensor initial setting and then performs forced toner supply twice. To start this SP mode, press the "Start" key. This SP mode has the same effect as doing SP2-214 then doing SP2-207 twice. **This SP mode must be done only at copier installation.** This SP mode takes totally about 3 minutes.	
3-001	ID Sensor Initial Setting	Performs the ID sensor initial setting. ID sensor output for the bare area of the drum (V_{SG}) is adjusted to 4.0 ± 0.2 V. *To start this SP mode, press the "Start" key.*	
3-002	ID Sensor Initial Setting Display †	Displays the initial setting value of the ID sensor. *Normally 4.0 ± 0.2 V is displayed. If the ID sensor cannot be adjusted to 4.0 ± 0.2 V, the ID sensor or the OPC drum should be cleaned.*	
3-103-001 to 3-103-002	ID Sensor Output Display †	Displays the ID sensor outputs. SP3-103-001: V_{SP} SP3-103-002: V_{SG} *Normally, $V_{SP} = 0.01 \sim 2.50$ V, $V_{SG} = 4.0 \pm 0.2$ V ($V_{SP}/V_{SG} \approx 0.1$)*	
3-105	Forced V_L Detection	After the "Start" key is pressed, the initial V_{LP}/V_{LG} (= V_{REF}) is determined. *For when to use this SP mode, see "Practical SP Mode Use Table".*	
3-106	Initial V_{LP}/V_{LG} Display †	Displays the initial V_{LP}/V_{LG} value determined by SP3-105.	
3-107	Current V_{LP}/V_{LG} Display †	Displays the current V_{LP}/V_{LG} value [%]. *This is the value currently being used for V_L correction.*	
3-111	Current V_{RP}/V_{RG} Display †	Displays the current V_{RP}/V_{RG} value [%] *This is the value currently being used for V_R correction.*	

Mode No.		Function	Settings
3-112	Forced V_R Detection	After the "Start" key is pressed, forced V_R detection is done. *For when to use this SP mode, see "Practical SP Mode Use Table".*	
3-123	Drum Initialize	This resets the following data regarding the OPC drum: 1. V_R correction level 2. V_L correction level 3. OPC counter 4. T/H correction level ***This SP mode must be used only when a new drum is installed.*** *Refer to "Practical SP Mode Use Table" for the exact timing for using this SP mode.*	
3-801	Auto Process Control Mode Selection †	Selects whether auto process control mode is on or off. If the auto process control mode is switched off, V_R correction, V_L correction, and the 1000-copy process control cycle will not be performed. *This SP mode can be used to help determine whether a copy quality problem is caused by process control or by the machine itself.*	0: OFF **1: ON**
3-901	Free Run (Exposure Lamp Off)	Performs a free run with the exposure lamp off. *Start the free run by pressing the "Start" key and stop it by pressing the "Clear/Stop" key.* ***Be sure to perform this mode without a development unit, or too much toner will be consumed from the developer, causing low image density.***	
3-902	Forced Process Control	Performs the 1000-copy process control cycles forcibly. V_{SG} initial adjustment → V_R detection → V_L detection → V_{ADS} (pattern) adjustment *This mode starts after the "Start" key is pressed.*	
4-001	Exposure Lamp Voltage Adjustment †	Adjusts the exposure lamp voltage (0.5 V per step [Range: 50.0 V to 75.0 V]) *For 115 V machines, the actual applied voltage = displayed value x 1.1412.* ***After doing this SP mode, ADS initial setting (SP4-201) and forced V_L detection (SP3-105) must also be done.*** *See "Replacement and Adjustment - Copy Quality Adjustments" for how to adjust.*	50.0 ~ 75.0 V **Default = 63 V** ‡

<table>
<tr><th colspan="2">Mode No.</th><th>Function</th><th>Settings</th></tr>
<tr><td>°4-002</td><td>Exposure Lamp Voltage Display †</td><td>Displays the current exposure lamp voltage.
(0.5 V per step [Range: 50.0 V to 85.0 V])
<i>For 115 V machines, the actual applied voltage = displayed value x 1.1412.</i></td><td>50.0 ~ 85.0 V</td></tr>
<tr><td>4-008</td><td>Vertical Magnification Adjustment †</td><td>Adjusts the magnification in the paper travel direction.
(0.1% per step [Range: –1.6% to +1.6%])
See "Replacement and Adjustment - Copy Quality Adjustments" for how to adjust.</td><td>0 ~ 32 V
Default = 16 ‡</td></tr>
<tr><td>4-011-001
to
4-011-009</td><td>Lens Horizontal H.P. Adjustment †</td><td>Adjusts the lens horizontal home position for each paper feed station.
(0.2 mm per step [Range: –3.2 mm to +3.2 mm])
<table>
<tr><th>SP Number</th><th>Without Duplex</th><th>With Duplex</th></tr>
<tr><td>4-011-001</td><td>1st tray</td><td>Duplex</td></tr>
<tr><td>4-011-002</td><td>2nd tray</td><td>1st tray</td></tr>
<tr><td>4-011-003</td><td>3rd tray</td><td>2nd tray</td></tr>
<tr><td>4-011-004</td><td>4th tray</td><td>3rd tray</td></tr>
<tr><td>4-011-005</td><td>5th tray</td><td>4th tray</td></tr>
<tr><td>4-011-006</td><td>By-pass</td><td>By-pass</td></tr>
<tr><td>4-011-007</td><td>LCT</td><td>LCT</td></tr>
<tr><td>4-011-008</td><td colspan="2">Base Adjustment</td></tr>
<tr><td>4-011-009</td><td>ADF</td><td>ADF</td></tr>
</table>
<i>SP4-011-008 changes the home position for all paper feed stations at the same time. It is mainly used for making factory adjustments. If it is shifted by a certain amount, all other SP4-011 adjustments move by the same amount.
See "Replacement and Adjustment - Copy Quality Adjustments" , and "Side-to-side Registration" in the ARDF manual for details on how to adjust.</i></td><td>0 ~ 32 V
Default = 16
‡ (only 4-011-008 is on the data sheet)</td></tr>
<tr><td>4-013</td><td>Scanner Free Run</td><td>Starts the scanner free run.
<i>Start the scanner free run by pressing the "Start" key, and stop it by pressing "Clear/Stop".</i></td><td></td></tr>
<tr><td>4-101</td><td>Horizontal Magnification Adjustment †</td><td>Adjusts the magnification perpendicular to the direction of paper travel.
(0.2% per step [Range: –1.6% to +1.6%])
See "Replacement and Adjustment - Copy Quality Adjustments" for how to adjust.</td><td>0 ~ 32
Default =16 ‡</td></tr>
</table>

<table>
<tr><th colspan="2">Mode No.</th><th>Function</th><th>Settings</th></tr>
<tr><td>4-102</td><td>Lens Error Correction †</td><td>Adjusts the lens position to correct for magnification in enlarge/reduce mode.
(0.1% per step [Range: –0.8% to +0.8%])</td><td>0 ~ 16
Default: 8 (0%) ‡</td></tr>
<tr><td>4-103</td><td>Focus Adjustment †</td><td>Adjusts the 3rd mirror position to correct the fine focus.
(0.05 mm per step [Range: left 3.75 mm to right 3.75 mm])
See "Replacement and Adjustment - Copy Quality Adjustments" for how to adjust.</td><td>0 ~ 150
Default = 75 ‡</td></tr>
<tr><td>4-201</td><td>Auto ADS Gain Adjustment</td><td>Adjusts the ADS gain automatically to make the sensor output 2.7 ± 0.1 V.
<i>Close the platen cover to prevent external light from reaching the ADS sensor. Then press the "Start" key to make the adjustment.</i></td><td></td></tr>
<tr><td>4-202</td><td>ADS Initial Gain Display †</td><td>Displays the ADS sensor output adjusted by SP4-201.</td><td></td></tr>
<tr><td>4-203</td><td>ADS Actual Gain Display †</td><td>Displays the current ADS sensor output.</td><td></td></tr>
<tr><td>4-301</td><td>APS Sensor Function Check †</td><td>Check the APS sensors.
If they are working correctly, the following value is displayed in the reduce/enlarge indicator.
<table>
<tr><th rowspan="2"></th><th colspan="2">LT Version</th><th rowspan="2">A4 Version</th></tr>
<tr><th>Without optional APS</th><th>With optional APS</th></tr>
<tr><td>ADF/Platen Open</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>ADF/Platen Closed</td><td>95</td><td>127</td><td>95</td></tr>
</table></td><td>LT version:
0 or 95 (without optional APS)
0 or 127 (with optional APS)
A4 version:
0 or 95</td></tr>
<tr><td>4-302</td><td>Optional APS Sensor †
(LT version only)</td><td>Set this to 1 when installing the optional APS sensor.
<i>This SP mode is effective only for the LT version. In the A4 version, even if "1" is selected, the setting is ignored.</i></td><td>0: Not installed
1: Installed</td></tr>
<tr><td>4-303</td><td>APS A5/HLT Detection †</td><td>Selects whether A5/HLT forced detection is done or not.
<i>If "YES" is selected, paper sizes that cannot be detected by the APS sensors are regarded as A5 lengthwise (for A4 models) or 5 1/2" x 8 1/2" (for LT models).
If "NO" is selected, "Check Paper Size" will be displayed.</i></td><td>0: NO
1: YES</td></tr>
</table>

<table>
<tr><th colspan="2">Mode No.</th><th>Function</th><th>Settings</th></tr>
<tr><td>4-901</td><td>APS Size Priority (for F4 size) †</td><td>Selects which copy paper size the machine selects when the APS sensors detect F4 lengthwise (8½" x 13").</td><td>0: 8½" x 13"
1: 8" x 13"
2: 8¼" x 13"</td></tr>
<tr><td>•°4-902</td><td>APS 8K/16K Detection †
(A4 versions only)</td><td>Selects whether the machine can select 8K/16K copy paper based on APS sensor readings.
If "YES" is selected, 8K/16K copy paper is selected under the following conditions:
<table>
<tr><th>Size detected by APS</th><th>Selected copy paper size</th></tr>
<tr><td>B4 lengthwise</td><td>8K lengthwise
(267 mm x 390 mm)</td></tr>
<tr><td>A4 lengthwise</td><td>16K lengthwise
(267 mm x 195 mm)</td></tr>
<tr><td>B5 sideways</td><td>16K sideways
(115 mm x 267 mm)</td></tr>
</table></td><td>0: NO
1: YES</td></tr>
<tr><td>•°5-001</td><td>All Indicators ON †</td><td>Turns on all indicators on the operation panel.</td><td></td></tr>
<tr><td>•°5-002</td><td>Feed Station Priority Selection †</td><td>Selects the paper feed station priority.
<table>
<tr><th>Setting</th><th>Non duplex machines</th><th>Duplex machines</th></tr>
<tr><td>1</td><td>1st Tray</td><td>1st Tray</td></tr>
<tr><td>2</td><td>2nd Tray</td><td>2nd Tray</td></tr>
<tr><td>3</td><td>3rd Tray</td><td>3rd Tray</td></tr>
<tr><td>4</td><td>4th Tray</td><td>4th Tray</td></tr>
<tr><td>5</td><td>5th Tray</td><td>LCT</td></tr>
<tr><td>6</td><td>LCT</td><td>—</td></tr>
</table></td><td>1 ~ 6: Non duplex machines
1 ~ 5: Duplex machines
Default = 1
(without LCT)
Default = LCT (5 or 6)
(with LCT)</td></tr>
<tr><td>•°5-003</td><td>APS Priority Selection †</td><td>Specifies whether the copier defaults to APS or manual mode when the main switch is turned on, auto reset, or mode cleared.</td><td>1: APS
2: Manual
Also see SP6-010.</td></tr>
<tr><td>•°5-004</td><td>ADS Priority Selection †</td><td>Specifies whether the copier defaults to ADS or manual ID mode when the main switch is turned on, auto reset, or mode cleared.</td><td>1: ADS
2: Manual</td></tr>
<tr><td>•°5-013</td><td>Counter Up/Down Selection †</td><td>Selects whether the counter counts up or down.</td><td>1: Up
2: Down</td></tr>
<tr><td>•°5-017</td><td>Maximum Copy Quantity †
(Copy Limit)</td><td>Limits the maximum copy quantity that can be entered.</td><td>1 ~ 999
Default = 999</td></tr>
<tr><td>•°5-019-001 to 5-019-008</td><td>Paper Size Set †</td><td>Sets the paper size for each paper tray and feed station.</td><td>For how to input the settings, see section 2.7.</td></tr>
</table>

Mode No.		Function	Settings
•°5-101	Auto Reset Time Setting †	Inputs the auto reset time after the copier enters standby, or disables auto reset. *(1 second per step [Range: 1 ~ 999])* *If "0" is selected, auto reset is disabled.*	0 ~ 999 **Default = 60**
•°5-102	Auto Energy Saver Time Setting †	Sets the time that the machine enters energy saver mode after entering the ready condition, or disables energy saver mode. *(1 second per step [Range: 1 ~ 999])* *If "0" is selected, the energy saver mode is disabled.*	0 ~ 999 **Default = 60**
•°5-103	Auto Tray Shift †	Selects whether auto tray shift is on or off.	0: OFF **1: ON**
°5-104	A3/DLT Double Count †	Specifies whether the counter is doubled for A3/DLT paper. *If "ON" is selected, the total counter and the current user code counter counts up twice when A3/DLT copy paper is used.*	**0: OFF** 1: ON
•°5-106	Image Density Level Correction (ADS Correction) †	Selects the image density level correction. *The development bias voltage correction in ADS mode depends on this setting (see "ADS Correction" in the Process Control section for details).*	0: Dark **1: Normal** 2: Light
•°5-107-001 to 5-107-002	Image Shift Margin Adjustment †	This controls the margin width adjustment for the Left and Right margin adjustment keys. SP5-107-001: Left SP5-107-002: Right *SP5-908 must be at 2 for this to have any effect; this changes the function of the Erase key to a Margin Adjustment key.* *(A4 version: 1 mm per step [Range: 0 mm to 15 mm],* *LT version: 0.01" per step [Range: 0" to 0.60"])*	**A4 version** 0 ~ 15 **Default = 5** **LT version** 0 ~ 0.60 **Default = 0.20**
•°5-108	Edge Erase Margin Adjustment †	Adjusts the edge erase margin width in erase edge mode. *SP5-908 must be at 1 for this to have any effect. A strip of the selected width will be erased around the edges of the copy image.*	**A4 version** 1: 5 mm **2: 10 mm** **LT version** 1: 0.20" **2: 0.40"**

Mode No.		Function	Settings
•°5-110	Center Erase Margin Adjustment †	Adjusts the center erase margin width in erase center mode. *SP5-908 must be at 1 for this to have any effect.* *(A4 version: 1 mm per step [Range: 8 mm to 25 mm],* *LT version: 0.01" per step [Range: 0.32" ~ 1.00"])*	**A4 version** 8 ~ 25 **Default = 20** **LT version** 0.32 ~ 1.00 **Default = 0.80**
°5-113	Coin Lock Installation †	Specifies whether coin lock is installed or not (only for Japanese versions).	**0: Not installed** 1: Installed
5-115	Duplex Image Shift † (Back Side Margin)	Specifies whether duplex image shift (back side margin) is used or not. *If "YES" is selected, a 5 mm margin is made on the right of the reverse side of copies when making two-sided copies from one-sided originals.* *If the image shift mode has been selected with SP5-908 and if the user uses image shift mode, this SP mode has no effect.*	0: NO **1: YES**
°5-121	T/C (Total Counter) Count Up Timing †	Determines whether the total counter counts up at paper feed or at paper exit.	**0: Feed** 1: Exit
•°5-305	Auto Off Time Setting †	Sets the time to go into the auto off condition. If "0" is selected, the auto off feature is disabled. *(1 minute per step [Range: 1 minute to 999 minutes])* *In the auto off condition, no power is applied to the fusing unit.* *If any keys are pressed, any doors are opened, or the auto response sensor detects the operator, the auto off condition is canceled.* *SP 1-105-002 is also related to Energy Saver Mode.*	0 ~ 999 **Default = 0**
°5-401	User Code Mode †	After JP2 on the main board is cut, either key counter mode or user code mode can be selected with this SP mode.	**0: Key Counter** 1: User Code
•°5-402	User Code Counter Check †	Displays the user code counters. *The current user code is displayed in copy counter, and the copy count for that user code is displayed in the reduce/enlarge indicator. Hold down the "•" key to display the last three digits.* *Use the* $\boxed{+}$ *and* $\boxed{-}$ *keys to check each user code counter.*	

Mode No.		Function	Settings
•°5-404-001 to 5-404-002	User Code Counter Clear †	Resets the user code counters. SP5-404-001: Resets the counter for the user code that is now displayed in the reduce/enlarge indicator. SP5-404-002: Resets all the UC counters. To reset the counter(s), press R/# . *SP5-404-001: The user code must be input at the numeric keys before it can be displayed and the counter reset, so you must know what user codes are in use. Take a look with SP5-405.*	
•°5-405	User Code Number Setting †	Use this mode to input the user code numbers (max. 3 digits). *Up to 50 user codes can be set. To input a code, enter it at the numeric keys then press the R/# key. Then you can input another. To check the user codes input so far, use the + and − keys. The user codes input will be displayed in reduce/enlarge counter.*	1 ~ 999 (max. 50 codes)
•°5-407-001 to 5-407-002	User Code Number Clear †	Deletes user code numbers. SP5-404-001: Deletes individual user code numbers. Enter the required user code at the numeric keys, then press the R/# key. (To see which user codes are being used, use SP5-405.) SP5-404-002: Deletes all the user code numbers.	
°5-408	Number of Registered User Codes Display †	Displays the number of registered user codes in the reduce/enlarge indicator.	
°5-501-001	PM Interval Setting †	Sets the PM interval. (1000 copies per step [Range: 1 to 999])	1 ~ 999 **120: Type 1** **100: Type 2**
°5-501-002	PM Interval Setting (PM Alarm Mode Setting) †	Specifies whether PM alarm mode is on or off. *If PM alarm mode is on, the manual ID level/ADS indicator and copy counter blink when the PM counter reaches the PM interval.*	**0: OFF** 1: ON
5-504	RDS/CSS Alarm Level for Paper Jam (Paper Jam Alarm Level Setting) † Used in Japan only. Do not change the factory setting.		
5-505	RDS/CSS Alarm Level for SC (Service Call Alarm Level Setting) † Used in Japan only. Do not change the factory setting.		
°5-507	RDS/CSS Alarm Level for Supplies (Supply Alarm Mode Setting) † Used in Japan only. Do not change the factory setting.		

Mode No.		Function	Settings
5-801	Memory All Clear †	Resets all the correction data for process control and all software counters, and returns all modes and adjustments to the default settings. See Service Tables - section 2.2.4 for how to perform this SP mode.	
		Normally, this SP mode should not be performed. *This SP mode is required only when replacing the RAM board, or when the copier malfunctions due to a damaged RAM board.*	
5-802-001 to 5-802-002	Free Run Mode	Performs the free run SP5-802-001: Continuous free run SP5-802-002: One time free run	
		Before starting, close the platen or ARDF. *Press the "Start" key to start the free run.* *Press the "Clear/Stop" key to stop the free run.*	
5-803	Input Check Mode †	Displays the data received from sensors and switches.	For details, see Service Tables section 2-5.
5-804	Output Check Mode	Turns on the electrical components individually for test purposes.	For details, see Service Tables - section 2-6.
°5-810	SC Reset †	Resets any service call condition that was caused by a level A error (see the Troubleshooting section). After doing SP5-810, turn the copier main switch off and on.	
5-811	Machine Serial No. Input † For use with features that are available in Japan only		
°5-812	Telephone Number Input † **(A156 copier only)**	Use this to input the telephone number of the service representative (this is displayed when a service call condition occurs.) Maximum 16 digits. Press the "•" key to input a pause (–). Press the "Clear/mode" key to delete the input telephone number.	
°5-816	RDS/CSS Function Setting † For use in Japan only. Do not change the factory setting.		
5-817	Repair Time Transmission † For use in Japan only. Do not change the factory setting.		

Mode No.		Function	Settings
°5-905	APS A4/LT Sideways Priority †	Specifies whether the machine selects LT sideways paper if the original is A4. If "ON" is selected, LT sideways copy paper is selected automatically when the APS sensors detect an A4 sideways original. This feature does not work in reverse (A4 sideways paper is not selected for an LT sideways original).	**0: OFF** 1: ON
•°5-906	Manual Staple Reset Time Setting †	Sets the manual staple reset time. (1 second per step [Range: 1 to 999]) *After the end of a copy job in sort mode, manual staple mode is reset automatically when the manual staple reset time has passed.*	1 ~ 999 **Default = 20 s**
•°5-907	Cover Mode Selection †	Use to select whether to have a front cover or both front and back covers added to copies in cover mode. Copy paper for the cover pages should be placed on the by-pass feed table.	1: Front/Back **2: Front**
•°5-908	Image Shift/Erase Selection †	Selects whether to have an image shift mode or an image erase mode.	**1: Erase mode** 2: Shift mode
•°5-909	10 key Zoom/Size Magnification †	Selects whether to have a 10 key zoom function or a size magnification function.	**1: Size magnification** 2: 10 key zoom function
°5-910	Guidance Language Setting † **(A156 copier only)**	Selects the language used on the operation panel display (except for SP mode guidance).	1: English 2: French 3: German 4: Italian 5: Spanish 6: Swedish 7: Portuguese 8: Danish 9: Norwegian 10: Finnish 11: Dutch
•°6-001	SADF Auto Reset Time Setting †	Sets the auto reset time for SADF mode. (1 second per step [range: 1 to 99 seconds])	1 ~ 99 **Default = 5**

Mode No.		Function	Settings
•°6-002	ADF Free Size Setting †	Specifies whether ADF free size setting is on or off. *Switch this on if the user makes copies of originals that contain paper of different sizes. Advise users that skew may occur if the papers are of different widths, so for example, put the A4 pages sideways if accompanied by A3 pages.* *If this feature is switched on, the copying speed will be reduced.*	**0: OFF** 1: ON
°6-003	Auto Sort Selection †	Specifies whether auto sort mode is on or off. In auto sort mode, when two or more originals are placed on the ADF, sort mode is selected if the copy quantity is between 2 and 20.	**0: OFF** 1: ON
°6-005	Blank Copy for Last Odd Originals in Duplex †	Specifies whether a blank copy is added after the last page for an odd number of originals in duplex mode. *In SADF or platen mode, the last page always stays in the duplex unit, regardless of this setting.*	0: Not added (the last page stays in the duplex unit) **1: Added**
6-006-001 to 6-006-002	DF Registration Adjustment †	Adjusts the registration of the document feeder. SP6-006-001: One-sided original SP6-006-002: Two-sided original *(0.3 mm per step [Range: –4.8 mm to +4.8 mm])* *See "Vertical Registration" in the ARDF manual for details on how to use these adjustments.*	0 ~ 32 **Default = 16**
6-009	DF Free Run with Paper	To start the DF free run, put some sheets of paper on the ARDF then press the "Start" key. Stop the free run by pressing "Clear/Stop". *This is a general free run controlled from the copier. For more detailed free run modes, see the manual for the DF.*	
•°6-010	Auto APS Select (DF) †	Selects whether auto APS mode is used with the DF or not. *If "ON" is selected, APS mode is selected automatically when an original is placed on the DF. This SP mode is in effect only when the APS priority (SP5-003) is set to Manual.*	0: OFF **1: ON**
•°6-011	Thick/Thin Original Mode Selection †	Selects the original feed type for the DF. In thin mode, originals will not be pushed back against the left scale.	**0: Thick mode** 1: Thin mode

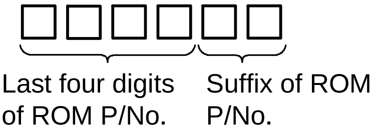
Mode No.		Function	Settings
°6-101	Sorter Installation †	Use this to specify which sorter is installed. *After setting this SP mode, the copier main switch must be turned off and on. For the A554 and A555 sorter stapler, the setting does not have to be changed (keep it at 0).*	**0: No sorter** 1: A557 sorter 2: A556 sorter 3: Not used 4: A568 sorter adapter only
°6-102	Sorter Stack Limit †	Select which sorter stack limit to use.	0: OFF **1: ON**
		OFF: Sorting and stacking can be done until the sorter' tray cannot take any more paper. Then copying stops and the R indicator lights. *ON: Sorting and stacking can be done until the following limit is reached. Then copying stops and the R indicator lights.* **A554 Sorter/Stapler** Sort Mode: 30 (A4/LT), 15 (B4/LG, A3/DLT) Stack Mode: 15 (A4/LT, B4/LG, A3/DLT) **A555 Sorter/Stapler** Sort Mode: 30 (A4/LT), 25 (B4/LG, A3/DLT) Stack Mode: 25 (A4/LT), 20 (B4/LG, A3/DLT) **A556 Sorter** Sort Mode: 30 (A4/LT), 15 (B4/LG), 10 (A3/DLT) Stack Mode: 30 (A4/LT), 10 (B4/LG, A3/DLT) **A557 Sorter** Sort or Stack Mode: 20 (A4/LT), 15 (B4/LG), 10 (A3/DLT)	
°6-104	Staple Sheet Limit †	Select whether there is a stapling limit for the sorter stapler.	0: OFF **1: ON**
		OFF: Copies of up to 25 pages can be stapled for all paper sizes. *ON: The staple indicator will go out after the following limit number of pages has been stacked and stapling will not be done even if the user selects stapling mode.* **A554 Sorter/Stapler:** 20 (A4 - B5/LT) , 10 (A3 - B4 / DLT - LG) **A555 Sorter/Stapler:** 20 (A4 - B5/LT, A3 - B4 / DLT - LG)	
6-107	Sorter Free Run Mode	Start the sorter free run by pressing the "Start" key. Stop it by pressing the "Clear/Stop" key. *This is a general free run controlled from the copier. For more detailed free run modes, see the sorter manuals.*	
°7-001	Total Operation Time Display †	Displays the total operation time (hours). *The first three digits are displayed in the reduce/enlarge indicator. Hold down the "•" key to display the last three digits.*	

<table>
<tr><th colspan="2">Mode No.</th><th>Function</th><th>Settings</th></tr>
<tr><td rowspan="2">°7-002</td><td rowspan="2">Total Original Counter Display †</td><td>Displays the total number of scanned originals (DF + platen).</td><td rowspan="2"></td></tr>
<tr><td><i>The first three digits are displayed in the reduce/enlarge indicator. Hold down the "•" key to display the last three digits.</i></td></tr>
<tr><td>°7-003</td><td colspan="3">Copy Charge Counter for RDS/CSS Display †
This is for use with features that are available only in Japan. However, it does show how many originals have been copied (total of DF mode + platen mode).
The 4th ~ 6th digits are displayed in the reduce/enlarge indicator. Hold down the "0" key to display the 7th digit, and hold down the "•" key to display the 3rd ~ 1st digits.</td></tr>
<tr><td>°7-004</td><td colspan="3">Initial Copy Counter Setting for RDS/CSS Display †
This is for use with features that are available only in Japan. However, it does show the total number of copies that have been made.
The 4th ~ 6th digits are displayed in the reduce/enlarge indicator. Hold down the "0" key to display the 7th digit, and hold down the "•" key to display the 3rd ~ 1st digits.</td></tr>
<tr><td rowspan="2">°7-101-001
to
7-101-005</td><td rowspan="2">Total Copies by Paper Size †</td><td>Displays the total number of copies by paper size.
<table>
<tr><td>SP Number</td><td>A4 Version</td><td>LT Version</td></tr>
<tr><td>SP7-101-001</td><td>A3</td><td>DLT</td></tr>
<tr><td>SP7-101-002</td><td>B4</td><td>LG</td></tr>
<tr><td>SP7-101-003</td><td>A4</td><td>LT</td></tr>
<tr><td>SP7-101-004</td><td>A5</td><td>HLT</td></tr>
<tr><td>SP7-101-005</td><td>Others</td><td>Others</td></tr>
</table></td><td rowspan="2"></td></tr>
<tr><td><i>The first three digits are displayed in the reduce/enlarge indicator. Hold down the "•" key to display the last three digits.</i></td></tr>
<tr><td rowspan="2">°7-203</td><td rowspan="2">Drum Counter †</td><td>Displays the drum rotation time (hours).</td><td rowspan="2"></td></tr>
<tr><td><i>The first three digits are displayed in the reduce/enlarge indicator. Hold down the "•" key to display the last three digits.</i></td></tr>
</table>

<table>
<tr><th colspan="2">Mode No.</th><th>Function</th><th>Settings</th></tr>
<tr><td rowspan="2">°7-204-001
to
7-204-008</td><td rowspan="2">Feed Unit Counter †</td><td>Displays the total number of copies fed from each feed unit.
<table>
<tr><th>SP Number</th><th>Without Duplex</th><th>With Duplex</th></tr>
<tr><td>SP7-204-001</td><td>1st tray</td><td>—</td></tr>
<tr><td>SP7-204-002</td><td>2nd tray</td><td>1st tray</td></tr>
<tr><td>SP7-204-003</td><td>3rd tray</td><td>2nd tray</td></tr>
<tr><td>SP7-204-004</td><td>4th tray</td><td>3rd tray</td></tr>
<tr><td>SP7-204-005</td><td>5th tray</td><td>4th tray</td></tr>
<tr><td>SP7-204-006</td><td>LCT</td><td>LCT</td></tr>
<tr><td>SP7-204-007</td><td>By-pass</td><td>By-pass</td></tr>
<tr><td>SP7-204-008</td><td>—</td><td>Duplex</td></tr>
</table></td><td rowspan="2"></td></tr>
<tr><td><i>The first three digits are displayed in the reduce/enlarge indicator. Hold down the "•" key to display the last three digits.</i></td></tr>
<tr><td rowspan="2">°7-205</td><td rowspan="2">DF Counter †</td><td>Displays the total number of originals fed by the DF.</td><td rowspan="2"></td></tr>
<tr><td><i>The first three digits are displayed in the reduce/enlarge indicator. Hold down the "•" key to display the last three digits.</i></td></tr>
<tr><td rowspan="2">°7-206</td><td rowspan="2">Stapler Counter †</td><td>Displays the total number of stapling runs.</td><td rowspan="2"></td></tr>
<tr><td><i>The first three digits are displayed in the reduce/enlarge indicator. Hold down the "•" key to display the last three digits.</i></td></tr>
<tr><td rowspan="2">°7-301-001
to
7-301-003</td><td rowspan="2">Total Copies by Magnification †</td><td>Displays the following counters:
7-301-001: Copies made in full size mode
7-301-002: Copies made with reduction
7-301-003: Copies made with enlargement</td><td rowspan="2"></td></tr>
<tr><td><i>The first three digits are displayed in the reduce/enlarge indicator. Hold down the "•" key to display the last three digits.</i></td></tr>
<tr><td>°7-401</td><td>Total Service Call Counter †</td><td>Displays the total number of service calls that have occurred.</td><td></td></tr>
<tr><td rowspan="2">°7-402</td><td rowspan="2">SC Counter by Service Call †</td><td>Displays the service call counters for each service call code.</td><td rowspan="2"></td></tr>
<tr><td>The service call code is displayed in the copy counter indicator, and the number of times this SC code has occurred is displayed in reduce/enlarge indicator.
By pressing the + and − keys, another service call number and its counter can be displayed.</td></tr>
</table>

<table>
<tr><th colspan="2">Mode No.</th><th>Function</th><th>Settings</th></tr>
<tr><td rowspan="2">°7-501</td><td rowspan="2">Total Jam Counter † (Copies + Originals)</td><td>Displays the total number of copy jams plus original jams (max. 4 digits).</td><td rowspan="2"></td></tr>
<tr><td><i>The first digit is displayed in the reduce/enlarge indicator. Hold down the "•" key to display the last three digits.</i></td></tr>
<tr><td rowspan="2">°7-502</td><td rowspan="2">Total Jams by Paper Size † (Note: This is actually the Total Copy Paper Jam Counter. The counter is not divided up by Paper Size)</td><td>Displays the total copy paper jam counter (max. 4 digits).</td><td rowspan="2"></td></tr>
<tr><td><i>The first digit is displayed in the reduce/enlarge indicator. Hold down the "•" key to display the last three digits.</i></td></tr>
<tr><td rowspan="2">°7-503</td><td rowspan="2">Total Original Jam Counter</td><td>Displays the total original jam counter (max. 4 digits).</td><td rowspan="2"></td></tr>
<tr><td><i>The first digit is displayed in the reduce/enlarge indicator. Hold down the "•" key to display the last three digits.</i></td></tr>
<tr><td rowspan="2">°7-504-001
to
7-504-006</td><td rowspan="2">Total Jams by Location †</td><td>Displays the total copy paper jam counts by location (max. 4 digits).
<table>
<tr><th>SP Number</th><th>Paper Jam Location Symbol</th></tr>
<tr><td>SP7-504-001</td><td>Y</td></tr>
<tr><td>SP7-504-002</td><td>A</td></tr>
<tr><td>SP7-504-003</td><td>B</td></tr>
<tr><td>SP7-504-004</td><td>C</td></tr>
<tr><td>SP7-504-005</td><td>Z</td></tr>
<tr><td>SP7-504-006</td><td>R</td></tr>
</table></td><td rowspan="2"></td></tr>
<tr><td><i>The first one digit is displayed in the reduce/enlarge indicator. Hold down the "•" key to display the last three digits.</i></td></tr>
<tr><td rowspan="2">°7-505-001
to
7-505-002</td><td rowspan="2">Total Original Jams by Location †</td><td>Displays the total original jams in the DF by location (max. 4 digits).
SP7-505-001: Feed-in section
SP7-505-002: Feed-out section</td><td rowspan="2"></td></tr>
<tr><td><i>The first digit is displayed in the reduce/enlarge indicator. Hold down the "•" key to display the last three digits.</i></td></tr>
</table>

<table>
<tr><th colspan="2">Mode No.</th><th>Function</th><th>Settings</th></tr>
<tr><td rowspan="2">°7-801-001
to
7-801-004</td><td rowspan="2">Main ROM Version Display †</td><td>Displays the main ROM version.
SP7-801-001: Copier main ROM version
SP7-801-002: Paper tray unit main ROM version
SP7-801-003: DF main ROM version
SP7-801-004: Sorter stapler main ROM version</td><td rowspan="2"></td></tr>
<tr><td><i>The ROM version is displayed by a six-digit number. The first three digits are displayed in the reduce/enlarge indicator. Hold down the "•" key to display the last three digits. The six-digit number shows the ROM version as follows.</i>



<table>
<tr><th>Last two digits</th><th>Suffix</th><th>Last two digits</th><th>Suffix</th></tr>
<tr><td>00</td><td>No suffix</td><td>13</td><td>M</td></tr>
<tr><td>01</td><td>A</td><td>14</td><td>N</td></tr>
<tr><td>02</td><td>B</td><td>16</td><td>P</td></tr>
<tr><td>03</td><td>C</td><td>17</td><td>Q</td></tr>
<tr><td>04</td><td>D</td><td>18</td><td>R</td></tr>
<tr><td>05</td><td>E</td><td>19</td><td>S</td></tr>
<tr><td>06</td><td>F</td><td>20</td><td>T</td></tr>
<tr><td>07</td><td>G</td><td>22</td><td>V</td></tr>
<tr><td>08</td><td>H</td><td>23</td><td>W</td></tr>
<tr><td>10</td><td>J</td><td>24</td><td>X</td></tr>
<tr><td>11</td><td>K</td><td>25</td><td>Y</td></tr>
<tr><td>12</td><td>L</td><td>26</td><td>Z</td></tr>
</table>

Note: <i>09, 15, 21 do not exist because suffixes I, O, and U are not used.</i></td></tr>
<tr><td rowspan="2">°7-803</td><td rowspan="2">PM Counter Check †</td><td>Displays the PM counter after the last PM (max. 6 digits).</td><td rowspan="2"></td></tr>
<tr><td><i>The first three digits are displayed in the reduce/enlarge indicator; hold down the "•" key to display the last three digits.</i></td></tr>
<tr><td rowspan="2">°7-804</td><td rowspan="2">PM Counter Clear</td><td>Resets the PM counter.</td><td rowspan="2"></td></tr>
<tr><td><i>The counter will be reset when you press the final</i> R/# <i>key when entering this SP mode.</i></td></tr>
</table>

<table>
<tr><th colspan="2">Mode No.</th><th>Function</th><th>Settings</th></tr>
<tr><td rowspan="2">°7-807-001</td><td rowspan="2">SC Counter Clear †</td><td>Resets the total SC counter (SP7-401) and the individual counters for each type of Service Call (SP7-402).</td><td rowspan="2"></td></tr>
<tr><td><i>To reset the counters, press the R/# key.</i></td></tr>
<tr><td rowspan="2">°7-807-002</td><td rowspan="2">Copy Jam Counter Reset †
(displayed as "SC Counter Clear")</td><td>Resets the total copy jam counter (SP7-502) and the copy jam counters for individual locations (SP7-504).</td><td rowspan="2"></td></tr>
<tr><td><i>To reset the counters, press the R/# key.</i></td></tr>
<tr><td rowspan="2">°7-807-003</td><td rowspan="2">Original Jam Counter Reset †
(displayed as "SC Counter Clear")</td><td>Resets the total original jam counter (SP7-503) and the original jam counters for individual locations (SP7-505).</td><td rowspan="2"></td></tr>
<tr><td><i>To reset the counters, press the R/# key.</i></td></tr>
<tr><td rowspan="2">°7-808</td><td rowspan="2">Counter All Clear</td><td>Resets the following counters.
<table>
<tr><th>Counters that are reset</th><th>Counter check</th></tr>
<tr><td>Operation Time</td><td>SP7-001</td></tr>
<tr><td>Scanning Counter</td><td>SP7-002</td></tr>
<tr><td>Copy Counter</td><td>SP7-101</td></tr>
<tr><td>Total Sheets of Paper Fed from the Paper Tray</td><td>SP7-204</td></tr>
<tr><td>DF Originals Counter</td><td>SP7-205</td></tr>
<tr><td>Stapler Counter</td><td>SP7-206</td></tr>
<tr><td>Reduction/Enlargement Counter</td><td>SP7-301</td></tr>
<tr><td>Total Service Call Counter</td><td>SP7-401</td></tr>
<tr><td>Each Service Call Counter</td><td>SP7-402</td></tr>
<tr><td>Jam Total Counter</td><td>SP7-501</td></tr>
<tr><td>Copy Paper Jam Total Counter</td><td>SP7-502</td></tr>
<tr><td>Original Jam Total Counter</td><td>SP7-503</td></tr>
<tr><td>Total Counter of Copy Paper Jams for Each location</td><td>SP7-504</td></tr>
<tr><td>Total Counter of Original Paper Jams for Each location</td><td>SP7-505</td></tr>
<tr><td>PM Counter</td><td>SP7-803</td></tr>
</table>
</td><td rowspan="2"></td></tr>
<tr><td><i>After pressing the final R/# key when entering this SP mode, the counters will be reset.</i></td></tr>
</table>

<table>
<tr><th colspan="2">Mode No.</th><th>Function</th><th>Settings</th></tr>
<tr><td rowspan="2">°7-810</td><td rowspan="2">Copy Counter Clear</td><td>Resets the following counters.
• Total Original Counter (SP7-002)
• Total Copies by Paper Size (SP7-101)
• Total Copies by Magnification (SP7-301)</td><td rowspan="2"></td></tr>
<tr><td><i>After pressing the final R/# key when entering this SP mode, the counters will be reset.</i></td></tr>
<tr><td rowspan="2">°7-811</td><td rowspan="2">DF Counter Clear</td><td>Resets the DF counter (SP7-205).</td><td rowspan="2"></td></tr>
<tr><td><i>After pressing the final R/# key when entering this SP mode, the counter will be reset.</i></td></tr>
<tr><td>°7-816-001
to
7-816-008</td><td>Feed Unit Counter Clear †</td><td>Reset one of the following counters by pressing the R/# key.
<table>
<tr><th>SP Number</th><th>Without Duplex</th><th>With Duplex</th></tr>
<tr><td>SP7-816-001</td><td>1st tray</td><td>—</td></tr>
<tr><td>SP7-816-002</td><td>2nd tray</td><td>1st tray</td></tr>
<tr><td>SP7-816-003</td><td>3rd tray</td><td>2nd tray</td></tr>
<tr><td>SP7-816-004</td><td>4th tray</td><td>3rd tray</td></tr>
<tr><td>SP7-816-005</td><td>5th tray</td><td>4th tray</td></tr>
<tr><td>SP7-816-006</td><td>LCT</td><td>LCT</td></tr>
<tr><td>SP7-816-007</td><td>By-pass</td><td>By-pass</td></tr>
<tr><td>SP7-816-008</td><td>—</td><td>Duplex</td></tr>
</table>
</td><td></td></tr>
</table>

2.4 UP MODE AND SP MODE CROSS REFERENCE TABLE

UP Mode	SP Mode	Function
1	5-019	Paper Size Set
2	5-002	Feed Station Priority Selection
3	5-003	APS Priority Selection
4	6-010	Auto APS Select (DF)
5	5-103	Auto Tray Shift
6	5-013	Counter Up/Down Selection
7	5-017	Maximum Copy Quantity
8	5-101	Auto Reset Time Setting
9	5-102	Auto Energy Saver Time Setting
10	5-305	Auto Off Time Setting
11	5-004	ADS Priority Selection
12	5-106	Image Density Level Correction
13	5-907	Cover Mode Selection
14	5-908	Image Shift/Erase Selection
15	5-909	10 Key Zoom/Size Magnification
16	5-107	Image Shift Margin Adjustment
17	5-108	Edge Erase Margin Adjustment
18	5-110	Center Erase Margin Adjustment
19	5-906	Manual Staple Reset Time Setting
20	6-001	SADF Auto Reset Time Setting
21	6-002	ADF Free Size Setting
22	6-011	Thick/Thin Original Mode Selection
23	5-402	User Code Counter Check
24	5-404	User Code Counter Clear
25	5-405	User Code Number Setting
26	5-407	User Code Number Clear
27	5-001	All Indicators On
28	4-902	APS 8K/16K Detection

2.5 SP5-803 SENSOR/SWITCH INPUT SIGNAL DATA CHECK

1. Access SP5-803 (refer to section 2.1).
2. Select the required 3rd level program number using the + and – keys. See the following page for a list of which 3rd level number to use for each component.

   NOTE: Do not press R/# after selecting the 3rd level program number or this SP mode will not operate.
3. If you want to check the signal during the copy cycle, enter the number of copies in the copy counter and press the Start key.
4. The reading ("0" or "1") will be displayed in the reduce/enlarge indicator.
5. To check the reading from another sensor, switch, or signal, repeat from step 2.

3rd level No.	Sensor/Switch/Signal	Reading	
		0	1
1	Upper Relay Sensor	Paper not detected	Paper detected
2	Lower Relay Feed Sensor	Paper not detected	Paper detected
3	3rd Tray Paper Feed Sensor (Paper Tray Unit)	Paper not detected	Paper detected
4	4th Tray Paper Feed Sensor (Paper Tray Unit)	Paper not detected	Paper detected
5	5th Tray Paper Feed Sensor (Paper Tray Unit)	Paper not detected	Paper detected
6	Registration Sensor	Paper not detected	Paper detected
7	Fusing Exit Sensor	Paper not detected	Paper detected
8	By-pass Feed Paper Width Sensor	See the Note after the end of this table.	
9	By-pass Feed Paper End Sensor	Paper detected	Paper not detected
10	By-pass Feed Table Switch	Table is closed	Table is open
11	Upper Tray Paper End Sensor	Paper detected	Paper not detected
12	Upper Tray Upper Limit Sensor	Down	Up
13	Not Used	–	–
14	Upper Tray Switch	Not set	Set
15	Lower Tray Paper End Sensor	Paper detected	Paper not detected
16	Lower Tray Upper Limit Sensor	Down	Up
17	Not Used	–	–
18	Lower Tray Switch	Not set	Set
19	1st Tray Paper End Sensor (Paper Tray Unit)	Paper detected	Paper not detected
20	1st Tray Upper Limit Sensor (Paper Tray Unit)	Down	Up

3rd level No.	Sensor/Switch/Signal	Reading	
		0	1
21	1st Tray Set Sensor (Paper Tray Unit)	Not set	Set
22	2nd Tray Paper End Sensor (Paper Tray Unit)	Paper detected	Paper not detected
23	2nd Tray Upper Limit Sensor (Paper Tray Unit)	Down	Up
24	2nd Tray Set Sensor (Paper Tray Unit)	Not set	Set
25	3rd Tray Paper End Sensor (Paper Tray Unit)	Paper detected	Paper not detected
26	3rd Tray Upper Limit Sensor (Paper Tray Unit)	Down	Up
27	3rd Tray Set Sensor (Paper Tray Unit)	Not set	Set
28	LCT Paper End Sensor	Paper detected	Paper not detected
29	LCT Upper Limit Sensor	Off	On
30	LCT Lower Limit Sensor	Off	On
31	LCT Connector	Not connected	Connected
32	LCT Tray Down Switch	Off	On
33	LCT Cover Switch	Cover closed	Cover open
34	Original Length Sensor 2	Off	On
35	Original Length Sensor 3	Off	On
36	Original Length Sensor 4	Off	On
37	Original Width Sensor 5	Off	On
38	Original Width Sensor 6	Off	On
39	Original Width Sensor 7	Off	On
40	Scanner H.P. Sensor	Off	On
41	Lens horizontal H.P. Sensor	Off	On
42	Lens vertical H.P. Sensor	Off	On
43	3rd scanner H.P. Sensor	Off	On
44	Optics Thermistor	Off	On
45	Platen Cover Close Sensor	Platen cover open	Platen cover closed
46	Platen Cover Open Sensor	Platen cover closed	Platen cover open
47	Vertical Guide Set Switch	Vertical guide closed	Vertical guide open
48	Paper Exit Cover Switch	Paper exit cover closed	Paper exit cover open
49	Front Cover Switch	Front cover closed	Front cover open
50	Sorter Entrance Sensor	Off	On
51	Sorter Bin H.P. Sensor	Off	On
52	Sorter Bin Lift Sensor	Off	On
53	Sorter Cover Switch	Cover closed	Cover open
73	Duplex Entrance Sensor	Off	On
74	Duplex Turn Sensor	Off	On
75	Duplex Paper End Sensor	Paper detected	Paper not detected
76	Upper Tray Switch	Not set	Set

3rd level No.	Sensor/Switch/Signal	Reading	
		0	1
77	Duplex Side Fence Jogger H.P. Sensor	Off	On
78	Duplex End Fence Jogger H.P. Sensor	Off	On
80	Main Motor Lock	Off	On
81	Fusing Unit Set Sensor	Not set	Set
82	Transfer Belt Contact H.P. Sensor	Off	On
83	Toner End Sensor	Toner remains	Toner end
84	Key Counter Set	Not set	Set
85	Not Used	–	–
86	Total Counter On	Off	On
87	Auto Response Sensor	Off	On
90	ADF Original Width Sensor-3	Off	On
91	ADF Original Width Sensor-2	Off	On
92	ADF Original Width Sensor-1	Off	On
93	ADF Registration Sensor	Paper not detected	Paper detected
94	ADF Feed Out Sensor	Paper not detected	Paper detected
95	ADF Position Sensor	ADF closed	ADF open
96	ADF APS Start Sensor	On	Off
97	ADF Feed In Cover Open Sensor	Cover closed	Cover open
98	ADF Feed Out Cover Open Sensor	Cover closed	Cover open

NOTE

When SP5-803-008 (By-pass Feed Paper Width Sensor) is selected, one of the following numbers will be displayed in the reduce/enlarge indicator, depending on the by-pass feed side fence position.

A4/A3 Version

Side Fence Position	Displayed Number
A3	7
11"	3
B4	11
A4 (lengthwise)	9
B5 (lengthwise)	13
A5 (lengthwise)	12
B6 (lengthwise)	14

LT/DLT Version

Side Fence Position	Displayed Number
11"	3
81/2"	9
8"	13
51/2"	14

2.6 SP5-804 ELECTRICAL COMPONENT CHECK

1. Access SP5-804 (refer to section 2.1).
2. Select the required 3rd level program number using the + and − keys. See below for a list of which 3rd level number to use for each component.
3. Press the Start key to turn on the electrical component.
4. Press the Clear/Stop key to turn off the electrical component.
5. To turn on another electrical component, repeat from step 2.

CAUTION: The motors keep turning in this output mode regardless of inputs from sensors. To prevent mechanical or electrical damage, do not keep the electrical component on for a long time.

3rd level No.	Electrical Component
1	Main motor
2	Relay clutch
3	Registration clutch
4	Transfer belt contact clutch
5	Junction gate SOL
6	Not used
7	Sorter drive motor (A556 and A557 sorters only)
8	By-pass feed CL
9	By-pass feed pick-up SOL (A153 and A157 copiers only)
10	Upper paper feed CL
11	Upper tray separation SOL
12	Upper tray pick up SOL
13	Upper tray lift motor (up)
14	Upper tray lift motor (down)
15	Lower paper feed CL
16	Lower tray separation SOL
17	Lower tray pick-up SOL
18	Lower tray lift motor (up)
19	Lower tray lift motor (down)
20	LCT pick-up SOL
21	Not used
22	Not used
23	LCT display
24	Bin drive motor up
25	Bin drive motor down

3rd level No.	Electrical Component
26	Sorter stapler roller drive motor
27	Sorter stapler turn gate SOL
28	Sorter stapler bin lift motor
29	Sorter stapler jogger motor
30	Sorter stapler grip motor
31	Sorter stapler stapler motor
35	Cooling fan
36	Exhaust fan
37	Optics cooling fan
40	Exposure lamp
41	Quenching lamp, PTL
42	Toner supply CL
43	Development CL
44	Toner supply bottle motor
50	ADF feed-in motor
51	ADF feed-in motor (reverse)
52	ADF belt drive motor
53	ADF belt drive motor (reverse)
54	ADF feed-out motor
55	ADF inverter SOL
56	ADF display on

2.7 SP5-019 PAPER SIZE SETTING

2.7.1 Paper Size Selection for the Paper Tray Unit, LCT, and By-pass Feed

For the paper tray unit, LCT and by-pass feed, the paper size can be selected with SP5-019 using the following procedure.

1. Enter SP mode as follows;
   1) Press the "Clear Modes" key.
   2) Enter "107" with the numeric keys.
   3) Hold down the "Clear/Stop" key for more than 3 seconds.

   NOTE: When SP mode is selected, "1" blinks in the 3rd digit of the copy counter, the Auto Image Density indicator starts blinking, and the reduce/enlarge indicator turns off.
2. Enter SP5-019 as follows
   1) Enter "5" and press the "Enter" key.
   2) Enter "019" and press the "Enter" key.
3. Press the [+] or [−] key until the required 3rd level program number is selected.

3rd level (001~008 can be selected with the [+] and [−] keys.	A153/A157 copiers		A155/A159 copiers		A156/A160 copiers	
	Paper Tray Indicator	**Paper Size Selection**	**Paper Tray Indicator**	**Paper Size Selection**	**Paper Tray Indicator**	**Paper Size Selection**
SP5-019-001	—	—	—	—	—	—
SP5-019-002	—	—	—	—	▷ 2	2nd Tray
SP5-019-003	▷ 3	3rd Tray	▷ 3	3rd Tray	▷ 3	3rd Tray
SP5-019-004	▷ 4	4th Tray	▷ 4	4th Tray	▷ 4	4th Tray
SP5-019-005	▷ 5	5th Tray	▷ 5	5th Tray	✋	By-pass Feed
SP5-019-006	✋	By-pass Feed	✋	By-pass Feed	▷ T	LCT
SP5-019-007	▷ 1	SPECIAL*	▷ T	LCT	▷ 1	SPECIAL*
SP5-019-008	—	—	▷ 1	*SPECIAL	—	—

Example: In an A155 copier, to select the paper size for the LCT, select 3rd level program 007.

NOTE:
- The 3rd level program number is blinking in the 1st digit of the copy counter.
- Depending on the 3rd level program number, the paper tray indicator changes.
- SP settings for each 3rd level program number are blinking in the reduce/enlarge indicator.

*SPECIAL: See section 2.7.2 "Special Paper Size Selection for the 1st Tray".

4. Select the required SP setting with the numeric keys in accordance with the following tables, then press the "Enter" key.

NOTE: If you input the wrong SP setting by mistake, you can cancel it by pressing the "Clear/Stop" key before pressing the "Enter" key.

Paper size SP settings for the paper tray unit

SP Settings	A4 Version	LT Version
0	—	—
1	A3 (lengthwise)	11" X 17"
2	B4 (lengthwise)	8½" X 14"
3	A4 (sideways)	11" X 8½"
4	A4 (lengthwise)	8½" X 11"
5	B5 (sideways)	—
6	B5 (lengthwise)	F (8" x 13"/lengthwise)
7	—	F4 (8½" x 13"/lengthwise)
8	F (8" x 13"/lengthwise)	Folio (8¼" x 13"/lengthwise)
9	F4 (8½" x 13"/lengthwise)	11" X 15"
10	Folio (8¼" x 13/ lengthwise)	10" X 14"
11	11" x 8½"	8" X 10½"
12	8½" x 11"	8" X 10"
13	8K (267 mm x 390 mm/lengthwise)	A4 (sideways)
14	16K (267 mm x 195 mm/sideways)	A4 (lengthwise)
15	16K (195 mm x 267 mm/lengthwise)	—

Paper size SP settings for by-pass feed
(See Detailed Descriptions, section 11.9.3)

SP Settings	A4 Version	LT Version
0	Paper size detected in accordance with the side fence position	
1	8½" x 11"	A4 (lengthwise)
2	B5 (lengthwise)	A4 (sideways)
3	A6 (lengthwise)	A5 (lengthwise)
4	F (8" x 13"/lengthwise)	A5 (sideways)
5	F4 (8½" x 13"/lengthwise)	A3 (lengthwise)
6	Folio (8¼" x 13"/lengthwise)	Folio (8¼" x 13"/lengthwise)
7	10" x 14"	—
8	8K (267 mm x 390 mm/lengthwise)	—
9	16K (267 mm x 195 mm/sideways)	—
10	16K (195 mm x 267 mm/lengthwise)	—

Paper size SP settings for the LCT

SP Settings	A4 Version	LT Version
0	—	—
1	11" x 8½"	11" x 8½"
2	A4 (sideways)	A4 (sideways)

5. Leave SP mode by pressing the "Clear Modes" key three times.

2.7.2 Special Paper Size Selection for the 1st Tray

For the 1st tray, a wider range of paper sizes can be selected using SP5-019-007 for A153, A156, A157, and A160 copiers, or SP5-019-008 for A155 and A159 copiers.

NOTE: The definition of the 1st tray differs with the type of copier. See "Installation - Paper Feed Station Definition".

If a special paper size is selected, the machine ignores the paper size set with the paper size slider.

Select the special paper size in accordance with the following table.

SP5-019-007 (A153, A156, A157, and A160 copiers) **SP5-019-008 (A155 and A159 copiers)**	**A4/LT Version**
0	Paper size detected by the paper size slider
1	A3 (lengthwise)
2	297 mm x 432 mm (maximum size)
3	B4 (lengthwise)
4	A4 (sideways)
5	A4 (lengthwise)
6	B5 (sideways)
7	B5 (lengthwise)
8	A5 (sideways)
9	B6 (sideways)
10	200 mm x 148 mm
11	210 mm x 170 mm
12	210 mm x 340 mm
13	11" x 17"
14	81/2" x 14"
15	11" x 81/2"
16	81/2" x 11"
17	81/2" x 51/2"
18	F (8" x 13"/lengthwise)
19	F4 (81/2" x 13"/lengthwise)
20	Folio (81/4" x 13"/lengthwise)
21	11" x 15"
22	10" x 14"
23	8" x 101/2"
24	8" x 10"
25	225 mm x 276 mm
26	250 mm x 300 mm
27	8K (267 mm x 390 mm/lengthwise)
28	16K (267 mm x 195 mm/sideways)
29	16K (195 mm x 267 mm/lengthwise)

3. PRACTICAL SP MODE USE TABLE

3.1 REPLACEMENT AND CLEANING

The following table shows the SP modes that must be done, and the order in which they must be done when the listed items are replaced or cleaned.

(Priority Number)

No.	SP Mode No.	Description	Replaced or Cleaned Item				
			Developer	OPC Drum (replaced)	ID sensor	ADS Sensor	Exposure Lamp/ Optics
1	2-214 (2-215)	TD Sensor Initial Setting	O				
2	3-123 (3-106) (7-203)	Drum Initialize		O			
3	3-001 (3-002)	ID Sensor Initial Setting		O	O		
4	3-112 (3-111)	Forced V_R Detection		O	O		
5	4-001 (4-002)	Exposure Lamp Voltage Adjustment		O			O
6	4-201 (4-202)	Auto ADS Gain Adjustment		O		O	O
7	3-105 (3-106)	Forced V_L Detection		O			O

(   ): SP Number to display the adjusted value.

3.2 MAJOR ADJUSTMENTS

The following table shows SP modes for major adjustments in the field:

TONER DENSITY (Detect Supply Mode)

Mode No.	Description	Settings
SP2-222	Toner Supply Ratio	1: 7%, 2: 15%, 3: 30%, 4: 60%

IMAGE DENSITY

Mode No.	Description	Settings
SP5-106	ADS Data Correction	0: Dark, 1: Normal, 2: Light
SP4-001	Exposure Lamp Voltage Adjustment	50 ~ 75V **(See the NOTE.)**
SP2-201-002	Lightest ID Level Development Bias (ID Level 7)	1: –40V, 2: ±0V, 3: –80V, 4: –120V

NOTE: After adjusting the Lamp Voltage, be sure to perform the Auto ADS Gain Adjustment (SP4-201) and the Forced V_L Detection (SP3-105).

OTHER COPY IMAGE ADJUSTMENTS

Mode No.	Description	Data
SP2-101-001	Leading Edge Erase Margin	0-32 (0.5 mm/step)
SP1-001	Registration	0-32 (0.5 mm/step)
SP4-008	Vertical Magnification	0-32 (0.1%/step)
SP4-101	Horizontal Magnification	0-32 (0.1%/step)
SP4-103	Focus Adjustment	0-150 (0.05 mm/step)
SP4-011	Lens Horizontal H.P. Adjustment	0-32 (0.2 mm/step)

3.3 DATA DISPLAY

The following table shows SP modes for displaying adjusted or detected values, or counter values.

Mode No.	Displayed Data	Mode No.	Displayed Data
1-106	Fusing Temperature	7-004	Initial Copy Counter Setting for RDS/CSS
2-002	Drum Charge Roller Voltage		
2-206	Development Bias	7-101	Total Copies by Paper Size
2-215	TD Sensor Output	7-203	Drum Counter
2-220	TD Sensor Initial Output	7-204	Feed Unit Counter
2-802	Drum Charge Roller Temperature	7-205	DF Counter
3-002	ID Sensor Initial Setting	7-206	Staple Counter
3-103	ID Sensor Output	7-301	Total Copies by Magnification
3-106	Initial VLP/VLG	7-401	SC Total Counter
3-107	Current VLP/VLG	7-402	SC Counter by Each Service Call
3-111	Current VRP/VRG	7-501	Total Jam Counter
4-002	Exposure Lamp Voltage	7-502	Total Copy Paper Jam Counter
4-202	ADS Initial Gain	7-503	Total Original Jam Counter
4-203	ADS Actual Gain	7-504	Total Jams by Location
5-402	User Code Counter	7-505	Total Original Jams by Location
5-408	Number of Registered User Codes	7-801	Main ROM Version
7-001	Total Operation Time	7-803	PM Counter
7-002	Total Original Counter		
7-003	Copy Charge Counter for RDS/CSS		

4. TEST POINTS (MAIN CONTROL BOARD)

Number	Label	Monitored Signal
TP1	(RXB)	RXB
TP2	(TXB)	TXB
TP3	(TXA)	TXA
TP4	(TXS)	TXS
TP5	(RXS)	RXS
TP6	(GND)	Ground
TP7	(+5 V)	+5 V
TP8	(TXL)	TXL
TP9	(P-SENSOR)	ID sensor output
TP11	(TRANS-FB)	Transfer current feed-back voltage
TP12	(LAMP)	Exposure lamp voltage feed-back voltage
TP13	(T-SENSOR)	Toner density sensor output
TP14	(ADS)	Auto image density sensor output
TP15	(RXA)	RXA
TP16	(CHA-FB)	Drum charge roller feed-back voltage
TP17	(DEV-BIAS)	Development bias feed-back voltage
TP18	—	Drum charge thermistor output
TP19	—	Not used
TP20	—	Secondary fusing thermistor output
TP21	—	Main fusing thermistor output

5. PREVENTIVE MAINTENANCE SCHEDULE

5.1 PM TABLE

NOTE: The amounts mentioned as the PM interval indicate the number of copies.

Symbol key: C: Clean, R: Replace, L: Lubricate, I: Inspect

A153/A155/A156	EM	120K	240K	360K	NOTE
OPTICS					
Mirrors, Lens, Reflector		C	C	C	Cotton pad with water, or blower brush.
Exposure Glass	C	C	C	C	Alcohol or glass cleaner
Exposure Lamp	I	I	I	I	Replace if necessary
Green Filter		C	C	C	Dry cloth
Scanner Guide Rails		C	C	C	Dry cloth
ADS, APS sensors		C	C	C	Blower brush. Do SP4-201 after cleaning the ADS sensor.
Lens Block Guide Rail	C	C	C	C	Dry cloth
Toner Shield Glass	C	C	C	C	Dry cloth
Dust Filter		C	C	C	Replace if necessary
NOTE: After cleaning the exposure lamp and/or optics, do SP4-001, then 4-201, then 3-105.					
AROUND THE DRUM					
Drum Charge Roller		R	R	R	Clean with the special cloth if necessary (the cloth must be dry)
Drum Charge Roller Cleaner		R	R	R	Replace with the drum charge roller as a set.
Drum Charge Roller Terminal		R	R	R	Replace with the drum charge roller as a set.
ID Sensor		C	C	C	Blower brush. After cleaning, do SP3-001 then SP3-112.
Erase Lamp		C	C	C	Dry cloth
Quenching Lamp		C	C	C	Dry cloth
Pick-off Pawls		C	R	C	Dry cloth
Pre-Transfer Lamp		C	C	C	Dry cloth and blower brush
DEVELOPMENT UNIT					
Developer		R	R	R	Do SP2-214 after replacement.
Side Seal		I	I	I	
Development Filter		R	R	R	
Entrance Seal	C	C	C	C	Replace if necessary
Toner Supply Unit	C	C	C	C	Blower brush
PAPER FEED (for each paper feed station)					
Pick-up, Feed, Separation Rollers (Paper tray)	C	C	R	C	Clean with water. Replace these rollers as a set.
Pick-up, Feed, Separation Rollers (LCT,By-pass feed)	C	C	R	C	Clean with water. Replace these rollers as a set.

A153/A155/A156	EM	120K	240K	360K	NOTE
Separation Torque Limiter (LCT, By-pass feed)			R		Clean with water. Replace these rollers as a set.
Paper Feed Guide Plate		C	C	C	Alcohol
Relay rollers		C	C	C	Alcohol or water
Registration roller		C	C	C	Alcohol or water
Bottom Plate Pad (Paper tray, By-pass feed, LCT)	C	R	R	R	Water
CLEANING UNIT					
Drum Cleaning Blade		R	R	R	Spread setting powder. See "Drum Cleaning Blade Replacement".
Side Seal		C	C	C	Replace if necessary
Cleaning Entrance Seal		C	C	C	Replace if necessary
TRANSFER BELT UNIT					
Transfer Belt	C	C	R	C	Spread setting powder. "See Transfer Belt Cleaning Blade Replacement"
Transfer Belt Cleaning Blade	C	R	R	R	
Used Toner Tank		C	C	C	Blower brush or vacuum cleaner
FUSING UNIT					
Fusing Entrance and Exit Guide Plates		C	C	C	Suitable solvent
Fusing Lamps		I	I	I	Replace if necessary
Hot Roller		R	R	R	
Pressure Roller		C	R	C	Suitable solvent
Fusing Thermistors	C	I	I	I	Suitable solvent
Hot and Pressure Roller Bearings		I	I	I	Replace if necessary
Fusing Antistatic Brush		I	I	I	Replace if necessary
Cleaning Roller		R	R	R	Suitable solvent
Cleaning Roller Bushings		I	I	I	Replace if necessary
Fusing Exit Rollers			C		
Turn Guide Transport Rollers			C		
Hot Roller Strippers	C	R	R	R	
DUPLEX TRAY					
Clutch Spring		L	L	L	Mobil Temp 78. See Note 1.
Feed Roller		R	R	R	
Bottom Plate Pad		R	R	R	
Mylars		I	I	I	Replace if necessary
OTHERS					
Drive Belts		I	I	I	Replace if necessary

A157/A159/A160	EM	100K	200K	300K	NOTE
OPTICS					
Mirrors, Lens, Reflector		C	C	C	Cotton pad with water, or blower brush
Exposure Glass	C	C	C	C	Alcohol or glass cleaner
Exposure Lamp	I	I	I	I	Replace if necessary
Green Filter		C	C	C	Dry cloth
Scanner Guide Rails		C	C	C	Dry cloth
ADS, APS sensors		C	C	C	Blower brush. Do SP4-201 after cleaning the ADS sensor.
Lens Block Guide Rail	C	C	C	C	Dry cloth
Toner Shield Glass	C	C	C	C	Dry cloth
Dust Filter		C	C	C	Replace if necessary
NOTE: After cleaning the exposure lamp and/or optics, do SP4-001, then 4-201, then 3-105.					
AROUND THE DRUM					
Drum Charge Roller		R	R	R	Clean with the special cloth if necessary (the cloth must be dry)
Drum Charge Roller Cleaner		R	R	R	Replace with the drum charge roller as a set.
Drum Charge Roller Terminal		R	R	R	Replace with the drum charge roller as a set.
ID Sensor		C	C	C	Blower brush. After cleaning, do SP3-001 then SP3-112.
Erase Lamp		C	C	C	Dry cloth
Quenching Lamp		C	C	C	Dry cloth
Pick-off Pawls		C	R	C	Dry cloth
Pre-Transfer Lamp		C	C	C	Dry cloth and blower brush
DEVELOPMENT UNIT					
Developer		R	R	R	Do SP2-214 after replacement.
Side Seal		I	I	I	
Development Filter		R	R	R	
Entrance Seal	C	C	C	C	Replace if necessary
Toner Supply Unit	C	C	C	C	Blower brush
PAPER FEED (for each paper feed station)					
Feed Rollers (Paper tray)	C	R	R	R	Water
Pick-up, Feed, Separation Rollers (LCT, By-pass feed)	C	C	R	C	Clean with water. Replace these rollers and the torque limiter as a set.
Separation Torque Limiter (LCT, By-pass feed)			R		Clean with water. Replace these rollers and the torque limiter as a set.
Paper Feed Guide Plate		C	C	C	Alcohol or water
Relay rollers		C	C	C	Alcohol or water
Registration roller		C	C	C	Alcohol or water
Bottom Plate Pad (Paper tray, By-pass feed, LCT)	C	R	R	R	Water

A157/A159/A160	EM	100K	200K	300K	NOTE
CLEANING UNIT					
Drum Cleaning Blade		R	R	R	Spread setting powder. See "Drum Cleaning Blade Replacement".
Side Seal		C	C	C	Replace if necessary
Cleaning Entrance Seal		C	C	C	Replace if necessary
TRANSFER BELT UNIT					
Transfer Belt	C	C	R	C	Spread setting powder. "See Transfer Belt Cleaning Blade Replacement" Wipe with a dry cloth.
Transfer Belt Cleaning Blade	C	R	R	R	
Used Toner Tank		C	C	C	Blower brush or vacuum cleaner
FUSING UNIT					
Fusing Entrance and Exit Guide Plates		C	C	C	Suitable solvent
Fusing Lamps		I	I	I	Replace if necessary
Hot Roller		R	R	R	
Pressure Roller		C	R	C	Suitable solvent
Fusing Thermistors	C	I	I	I	Suitable solvent
Hot and Pressure Roller Bearings		I	I	I	Replace if necessary
Fusing Antistatic Brush		I	I	I	Replace if necessary
Cleaning Roller		R	R	R	Suitable solvent
Cleaning Roller Bushings		I	I	I	Replace if necessary
Fusing Exit Rollers			C		
Turn Guide Transport Rollers			C		
Hot Roller Strippers	C	R	R	R	
DUPLEX TRAY					
Clutch Spring		L	L	L	Mobil Temp 78. See Note 1.
Feed Roller		R	R	R	
Bottom Plate Pad		R	R	R	
Mylars		I	I	I	Replace if necessary
OTHERS					
Drive Belts		I	I	I	Replace if necessary
PAPER TRAY UNIT (A553)					
Feed Rollers	C	R	R	R	Water
Relay rollers		C	C	C	Alcohol or water
Bottom Plate Pad	C	R	R	R	Water
Paper Feed Guide Plate		C	C	C	Alcohol or water
Sensors		I	I	I	Replace if necessary
Drive Belts		I	I	I	Replace if necessary

A157/A159/A160	EM	100K	200K	300K	NOTE
SORTER ADAPTER (A568)					
Exit Drive Roller			C		Alcohol or Water
Upper Roller			C		Alcohol or Water

	EM	120K	240K	360K	NOTE
PAPER TRAY UNIT (A549/A550)					
Pick-up, Feed, Separation Rollers	C	C	R	C	Water, Replace these rollers as a set.
Relay rollers		C	C	C	Alcohol or water
Bottom Plate Pad	C	R	R	R	Water
Relay Clutch		I	I	I	Replace every 1500K copies.
Feed Clutch		I	I	I	Replace if necessary
Drive Belts		I	I	I	Replace if necessary

	EM	80K	160K	240K	NOTE
AUTO DOCUMENT FEEDER (A548)		(for originals)			
Transport Belt	C	R	R	R	Belt cleaner
Friction Belt	C	R	R	R	Water
Feed Roller	C	R	R	R	Water

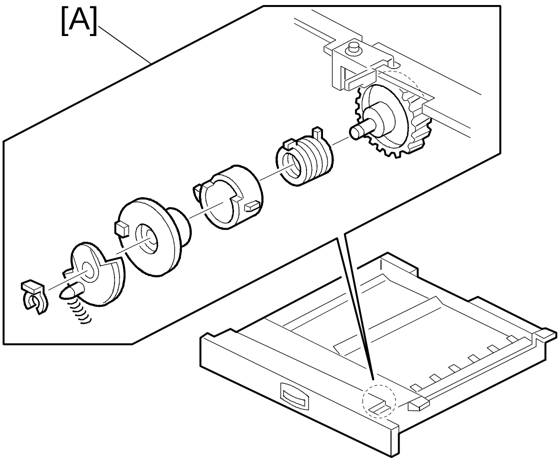
	EM	PM	NOTE
20-BIN SORTER STAPLER (A554)			
Transport and Exit Rollers	C	C	Alcohol or water
Bins	C	C	Alcohol or water
Bin and Paper Sensors	C	C	Blower brush
Bushings	L	L	Launa oil; if bushings generate noise.
Worm Gears	L	L	Grease G501; if worm gears generate noise.
Bin Cam Tracks	L	L	Grease G501; if bin cam tracks generate noise.
10-BIN SORTER STAPLER (A555)			
Transport Roller	C	C	Alcohol or water
Bins	C	C	Alcohol or water
Bin and Paper Sensors	C	C	Blower brush
Bushings	L	L	Launa oil; if bushings generate noise.
Helicam Wheels	L	L	Grease G501; if helicam wheels generate noise.
SORTER (A556/A557)			
Bin Guide/Wheel	L	L	Grease G501; if those generate noise.
Bushings	L	L	Grease G501; if bushings generate noise.
Exit Roller	C	C	Alcohol or water

Note 1.

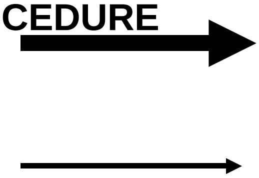
Duplex Tray: Clutch Spring

Do the following every 120K (A153/A155/A156 copiers) or 100K (A157/A159/A160 copiers).

Clean the clutch assembly [A]. Then lubricate the clutch spring with Mobil Temp 78.

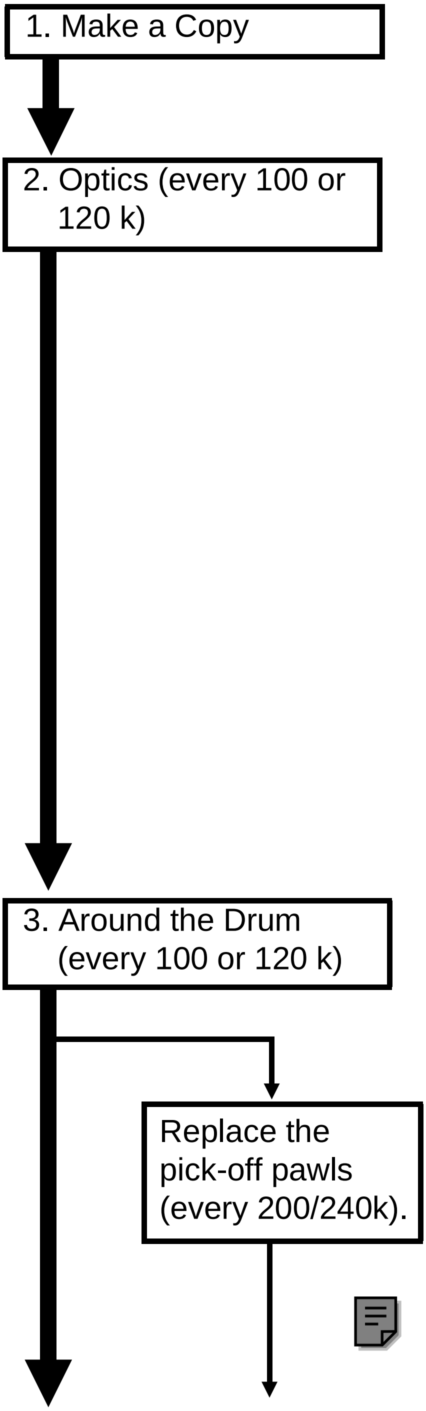


5.2 REGULAR PM PROCEDURE



Every 120k (A153/A155/A156), or 100k (A157/A159/A160)

Every 240k (A153/A155/A156), or 200k (A157/A159/A160)



1. Make a Copy

Make a copy of an OS-A3 test chart at manual image density level 4.

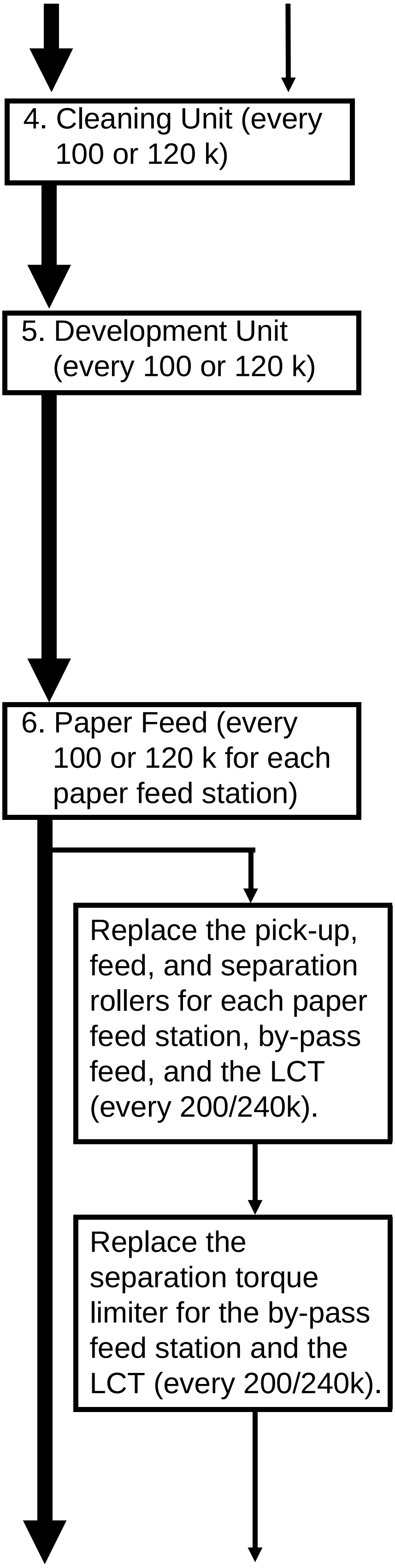
2. Optics (every 100 or 120 k)

1. Clean the mirrors, lens, and reflectors with a soft cloth, cotton pad with water, or a blower brush.
2. Clean the exposure glass with alcohol or glass cleaner.
3. Clean the scanner guide rail with a dry cloth.
4. Clean the lens block guide rail with a dry cloth.
5. Clean the ADS sensor and the original width and length sensors
6. Inspect the exposure lamp.
7. Clean the toner shield glass and the dust filter.

3. Around the Drum (every 100 or 120 k)

Replace the pick-off pawls (every 200/240k).

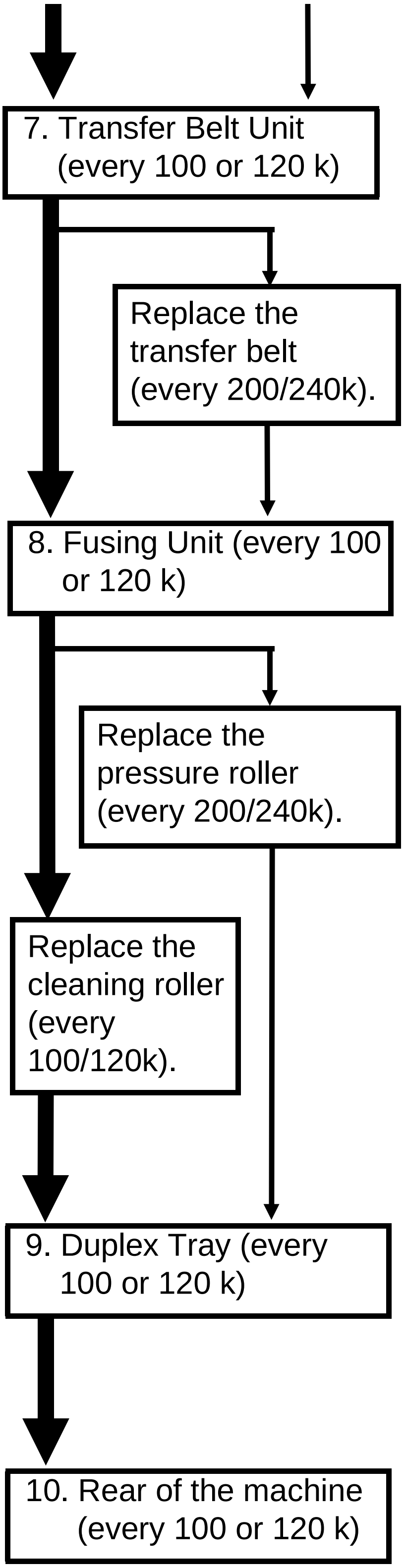
1. Remove the drum and clean the ID sensor with a blower brush.
2. Clean the pick-off pawls.
3. Clean the quenching, erase, and pre-transfer lamps with a dry cloth. Discharge any static electricity before putting them back.
4. Put back the drum.
5. Replace the drum charge roller, drum charge roller cleaner, and drum charge roller terminal.


4. Cleaning Unit (every 100 or 120 k)
5. Development Unit (every 100 or 120 k)
6. Paper Feed (every 100 or 120 k for each paper feed station)
Replace the pick-up, feed, and separation rollers for each paper feed station, by-pass feed, and the LCT (every 200/240k).
Replace the separation torque limiter for the by-pass feed station and the LCT (every 200/240k).

1. Clean the inside of the cleaning unit and the seals.
2. Replace the cleaning blade.

1. Remove the old developer.
2. Clean the development unit and seals.
3. Clean around the openings of the toner supply unit with a blower brush.
4. Pour in a pack of new developer.
5. Replace the development filter.

1. Clean the paper guide plate.
2. Clean the paper feed, pick-up, separation, and relay rollers for each paper feed station, by-pass feed, and the LCT.
3. Replace the bottom plate pad for each paper feed station, by-pass feed, and the LCT.
4. Clean the registration rollers.


7. Transfer Belt Unit (every 100 or 120 k)
Replace the transfer belt (every 200/240k).
8. Fusing Unit (every 100 or 120 k)
Replace the pressure roller (every 200/240k).
Replace the cleaning roller (every 100/120k).
9. Duplex Tray (every 100 or 120 k)
10. Rear of the machine (every 100 or 120 k)

1. Remove the transfer belt and clean the used toner tank with a blower brush or vacuum cleaner.
2. Clean the transfer belt.
3. Replace the transfer belt cleaning blade.

1. Clean the entrance and exit guide plates
2. Inspect the thermistor, fusing lamps, hot and pressure roller bearings, antistatic brush, and cleaning roller bushings.
3. Clean the pressure roller, cleaning roller, exit roller, and turn gate transport rollers.
4. Replace the hot roller strippers.
5. Replace the hot roller.

1. Inspect the mylars.
2. Replace the feed roller and the bottom plate pad.
3. Lubricate the clutch spring with Mobil Temp 78.

1. Inspect the timing belts.

11. Exterior (every 100 or 120 k)

1. Clean the covers.

12. Copy Process SP Mode Settings

Perform the following SP Modes in the following order.

1. SP2-214 TD Sensor Initial Setting
2. SP3-001 ID Sensor Initial Setting
3. SP3-112 Forced V_R Detection
4. * SP4-001 Exposure Lamp Voltage Adj.
5. SP4-201 Auto ADS Gain Adj.
6. * SP3-105 Forced V_L Detection

*: Perform these SP modes only if the exposure lamp has been replaced.

13. Make a Copy

Make a copy of an OS-A3 test chart at manual image density level 4.

6. SPECIAL TOOLS AND LUBRICANTS

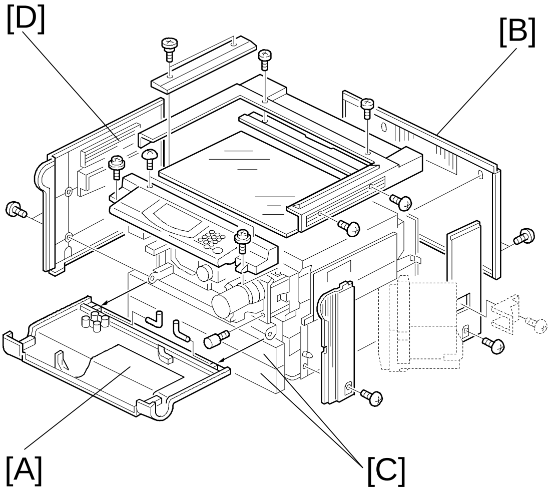
Part Number	**Description**	**Q'ty**
A153 9001	Scanner Adjustment Tool	1 set
A153 9004	WIPING CLOTH (Drum Charge Roller Cloth)	1
5420 9516	Test Chart - OS-A3 (10 pcs/set)	1
5420 9507	Digital Multimeter	1
A008 9502	Silicone Grease - G40M	1
5442 9103	Launa Oil	1
5447 9078	Heat Resistant Grease - MT-78	1
5203 9501	Grease - 501	1

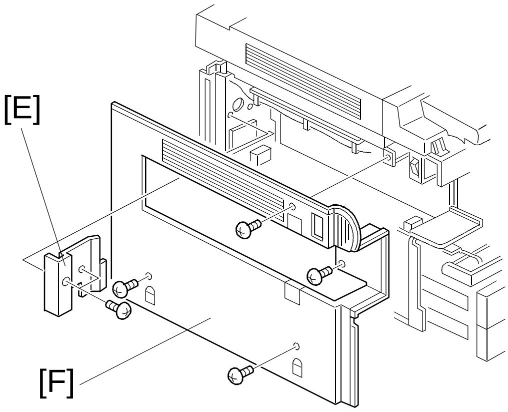
SECTION 5

REPLACEMENT AND ADJUSTMENT

1. INNER AND OUTER COVERS

1.1 OUTER COVER REMOVAL





1.1.1 Front Cover

1. Open the front cover [A].
2. Remove the front cover (2 pins).

1.1.2 Rear Cover

1. Loosen the 2 grounding screws for the upper holes.
2. Remove the rear cover [B] (2 screws).

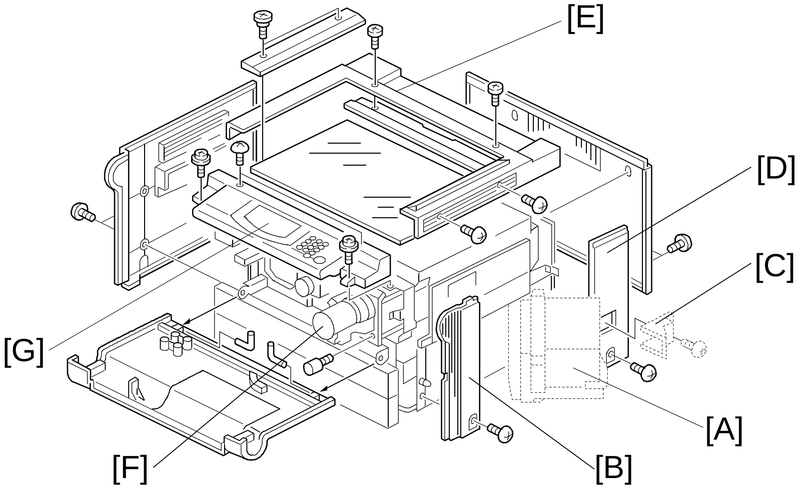
1.1.3 Left Cover

- A153/A155/A156 -

1. Open the front cover and pull out the paper trays [C].
2. Remove the left cover [D] (2 screws).

- A157/A159/A160 -

1. Open the front cover and pull out the paper trays.
2. Remove the cover plate [E] (2 screws).
3. Remove the left cover [F] (4 screws).



1.1.4 Front Right Cover

1. Open the front cover and pull out the paper trays.
2. **All models except A153/A157:** Swing open the optional LCT unit [A].
3. Remove the front right cover [B] (1 screw).

1.1.5 Rear Right Cover

1. Remove the rear cover.
2. **All models except A153/A157:** Remove the LCT harness cover [C] (1 screw) and the LCT rear cover (2 screws).
3. Remove the rear right cover [D] (1 screw).

1.1.6 Top Cover

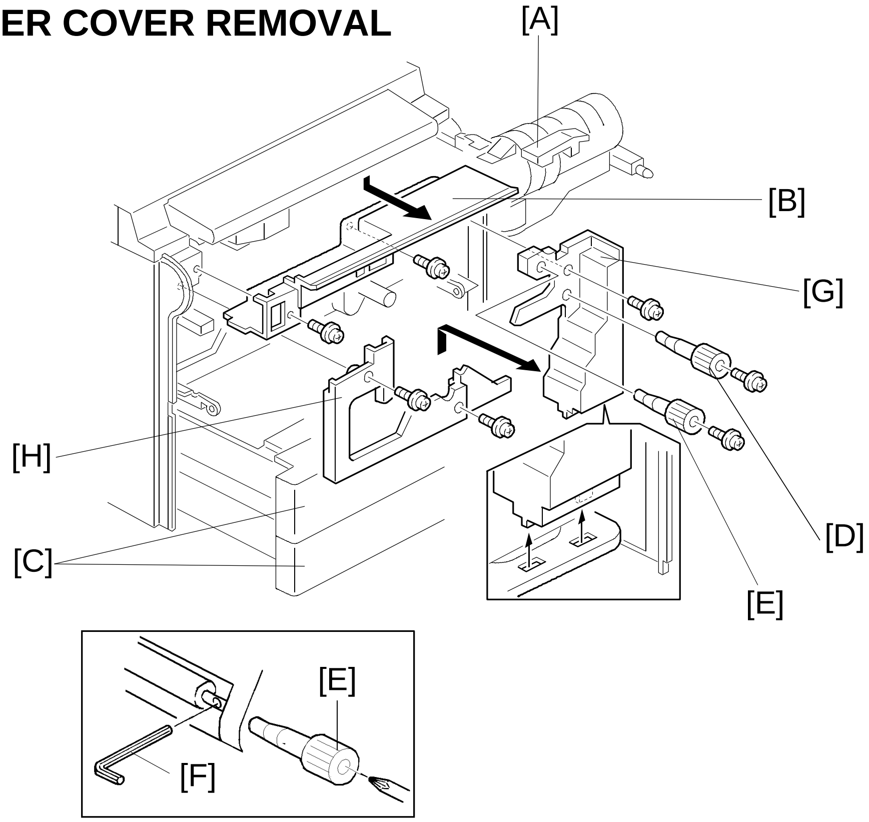
1. Remove the optional platen cover or the optional DF.
2. Remove the top cover [E] (6 screws).

1.1.7 Operation Panel

1. Lift up the optional platen cover or the optional DF.
2. Open the front cover and slide out the toner bottle holder assembly [F] (1 screw and 1 knob screw).
3. Remove the operation panel [G] (4 screws and 2 connectors).

   NOTE: For the A156 copier, remove 5 screws and 3 connectors.

1.2 INNER COVER REMOVAL



1.2.1 Upper Inner Cover

1. Open the front cover and slide out the toner bottle holder assembly [A] (1 screw and 1 knob screw).
2. Remove the upper inner cover [B] (2 screws).

1.2.2 Lower Right Inner Cover

1. Remove the front cover and open the tray units [C].
2. Remove the two knobs [D and E] (1 screw each).

   NOTE: 1. Knob [D] is not installed in A157/A159/A160 copiers.

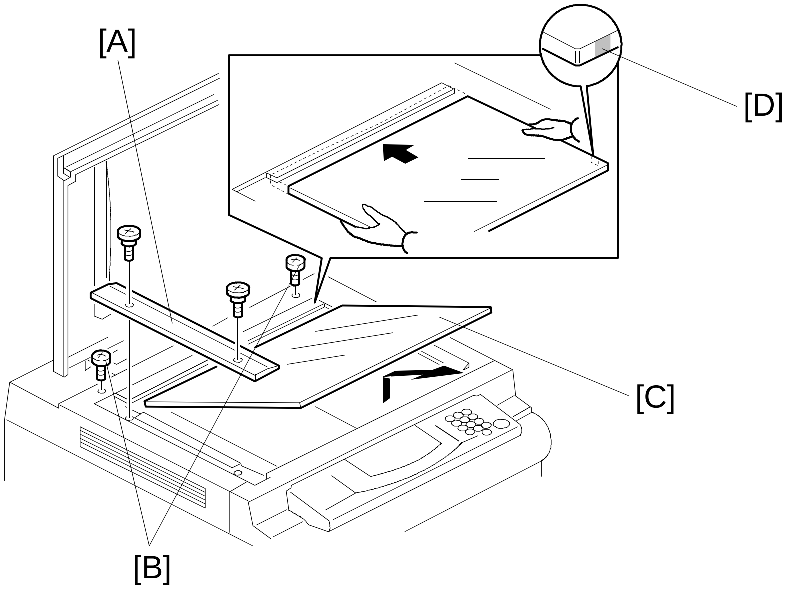
   2. When removing the knob [E], insert an allen key [F] into the hole in the registration roller shaft as shown in the illustration.
3. Remove the lower right inner cover [G] (1 screw).

1.2.3 Lower Left Inner Cover

1. Remove the front cover and open the tray units.
2. Remove the lower left inner cover [H] (2 screws).

2. OPTICS

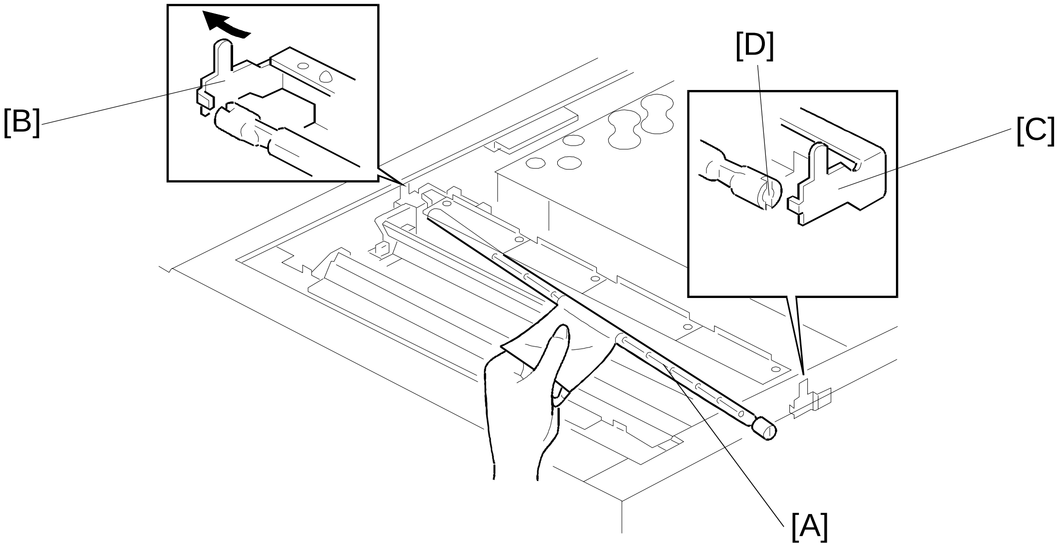
2.1 EXPOSURE GLASS REMOVAL



1. Remove the left scale [A] (2 shoulder screws).
2. Remove the 2 screws [B] securing the rear scale.
3. Grasp the front left corner of the exposure glass [C] and lift it up slightly. Then slide the exposure glass out from the rear scale.

NOTE: When reinstalling the exposure glass, make sure that the [D] is positioned at the front right corner as shown. This ensures that the correct side of the glass is face-up; this side is smoother and it generates less static electricity when the DF is used.

2.2 EXPOSURE LAMP REPLACEMENT



NOTE: Do not touch the reflector or the new exposure lamp with your bare hands. Use a strip of paper as shown. (Oil marks from fingers on the lamp or reflectors will be affected by heat from the lamp and will cause discoloration.)

1. Turn off the main switch and unplug the machine.
2. Remove the exposure glass. (See Exposure Glass Removal.)
3. Move the scanner lamp to the fan duct in the rear frame (about 150 mm from the home position).
4. Place a strip of paper around the exposure lamp [A].
5. Release the exposure lamp from the rear terminal [B] while pressing the rear terminal tab in the direction shown above.

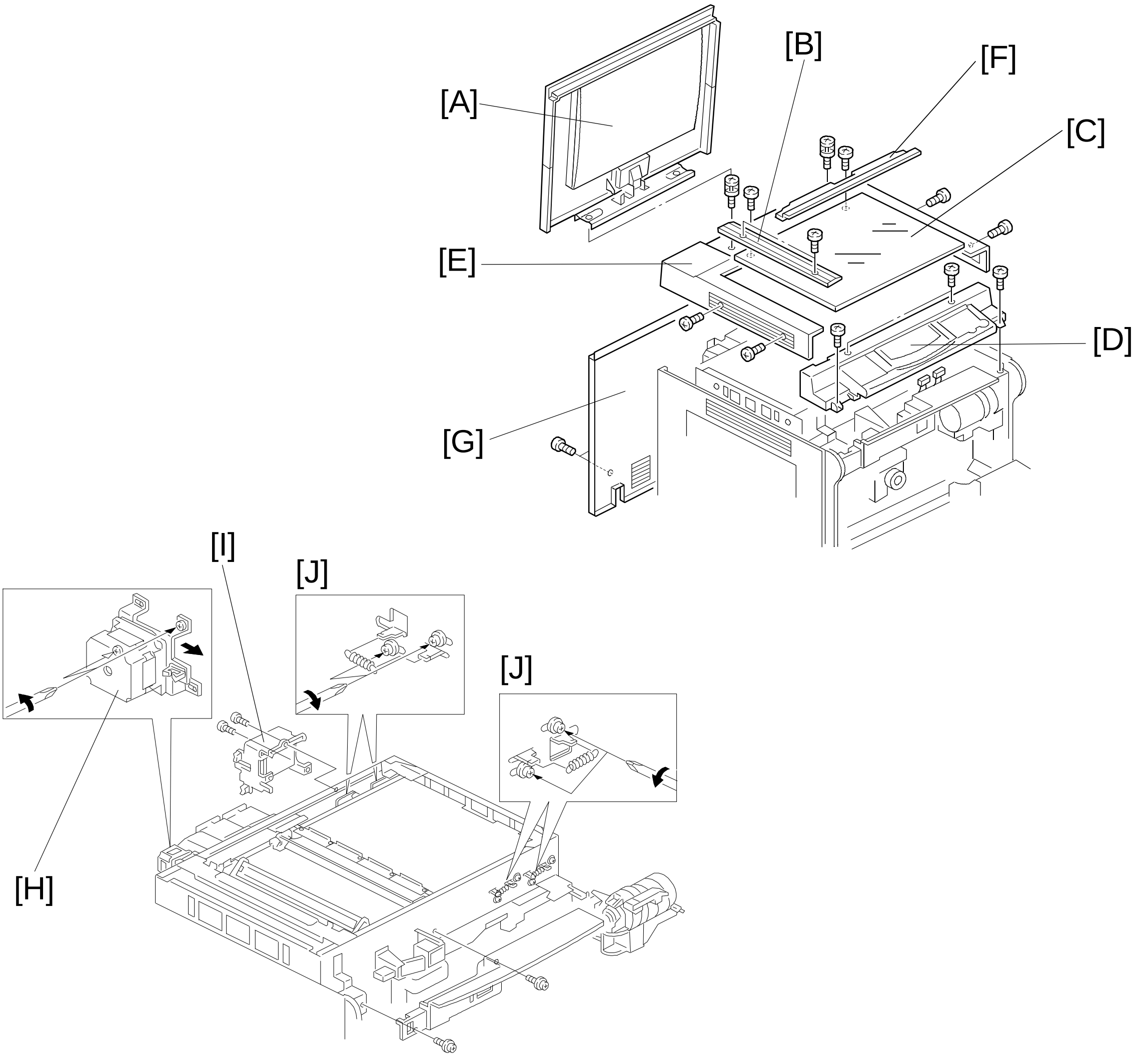
   NOTE: Push the terminal very gently, or it will be damaged.
6. Slide the exposure lamp into the rear cutout, and take out the exposure lamp from the front side.
7. Install a new lamp. Use a strip of paper to hold the lamp. Set the front terminal [C] first.

   NOTE: 1) Make sure that the exposure lamp is properly positioned at the front and rear terminals. (The slot [D] and terminal pin should engage.)

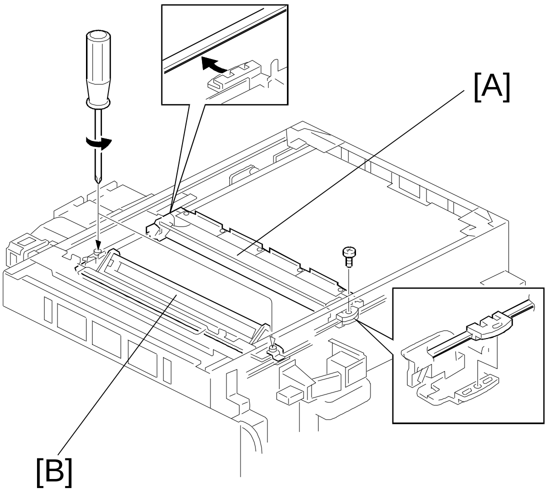
   2) Return the first scanner to the original position and make sure that the first scanner moves smoothly.

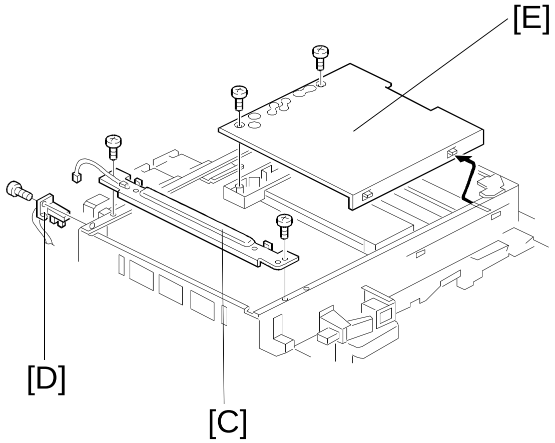
   3) Clean the optics components and perform the following SP modes in the following order: SP4-001, SP4-201, SP3-105.

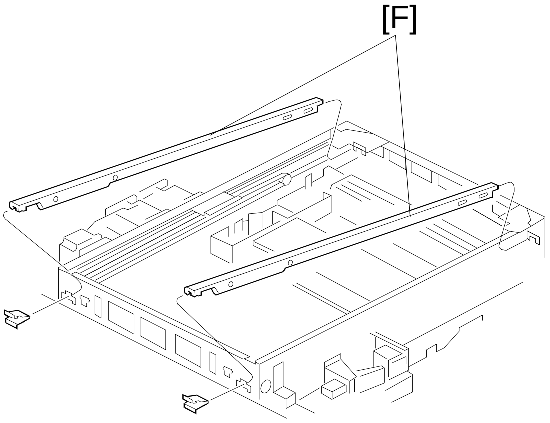
2.3 SCANNER DRIVE BELT REPLACEMENT



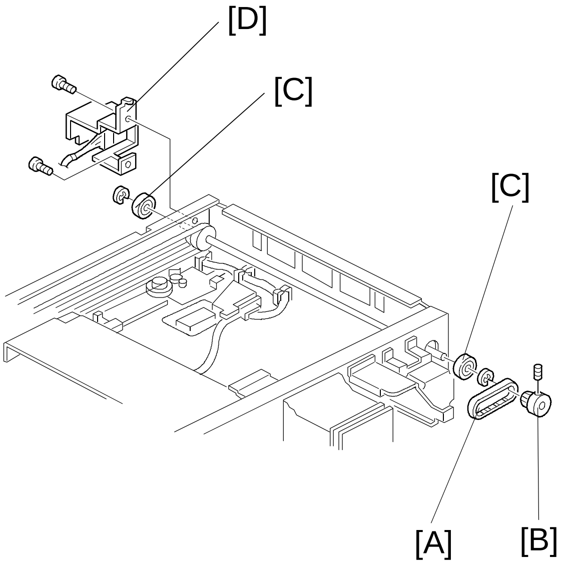
1. Remove the following parts:
   - Platen cover [A] or DF
   - Left scale [B] (2 shoulder screws)
   - Exposure glass [C]
   - Operation panel [D]
   - Top cover [E]
   - Rear scale [F]
   - Rear cover [G]
   - Upper inner cover
2. Loosen the 4 screws securing the scanner drive motor assembly [H].
3. Remove the main control board bracket (4 screws), and remove the C/B high voltage supply board assembly [I] (2 screws, 3 connectors and 1 clamp).
4. Loosen the screws securing the belt tension brackets [J] and remove all four belt tension springs as shown.

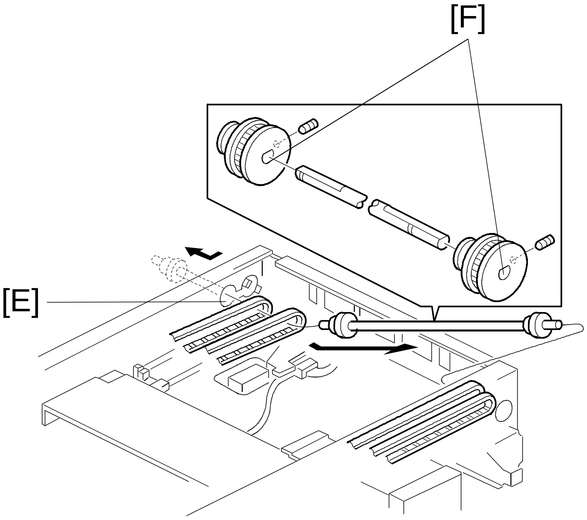






5. Remove the 1st scanner [A] from the scanner drive belt (1 screw).
6. Remove the 2nd scanner [B] from the scanner drive belt by loosening the 2 screws as shown.
7. Remove the left scale bracket [C] with the optics thermistor (2 screws and 1 connector).
8. Remove the scanner home position sensor bracket [D] (1 screw and 1 connector).
9. Remove the lens housing cover [E] (2 screws).
10. Remove both scanner guide rails [F] (1 spring plate each).





11. Remove the scanner motor belt [A] by removing the pulley [B] (1 Allen screw).

12. Remove both bearings [C] (1 E-ring each).

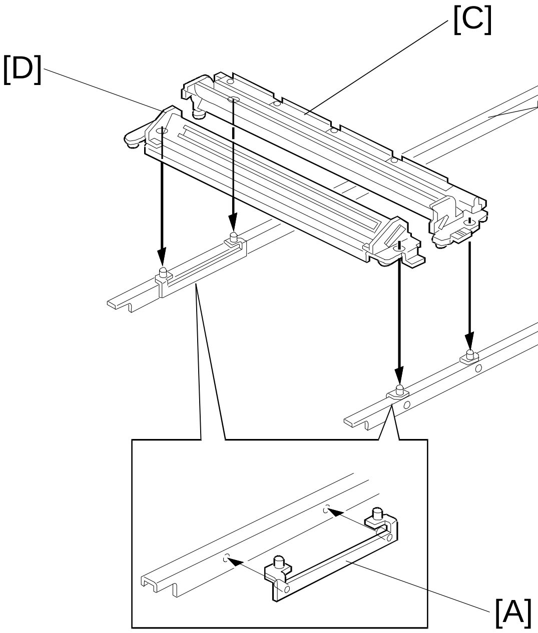
13. Remove the left cover and swing the main switch bracket [D] out of the way.

14. Slide the front pulley to the cutout [E] of the front frame and remove all four scanner drive belts.

NOTE: When reinstalling, make sure of the following points:

- If the pulleys [F] have been removed, make sure that they face the same direction as shown when you put them back.
- The belt tension bracket should be tightened after all the belt tension springs have been installed.
- Adjust the position of the 1st and 2nd scanner by using the positioning bracket kit. (See Scanner Positioning Adjustment.)

2.4 SCANNER POSITIONING ADJUSTMENT

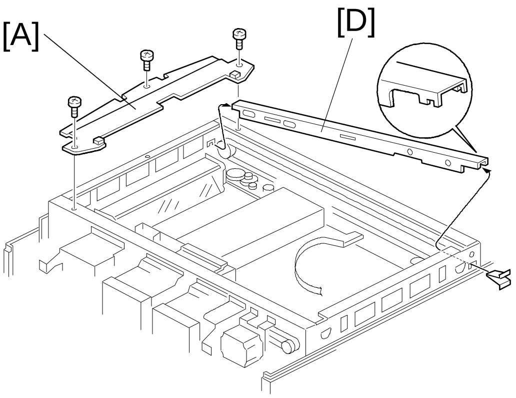


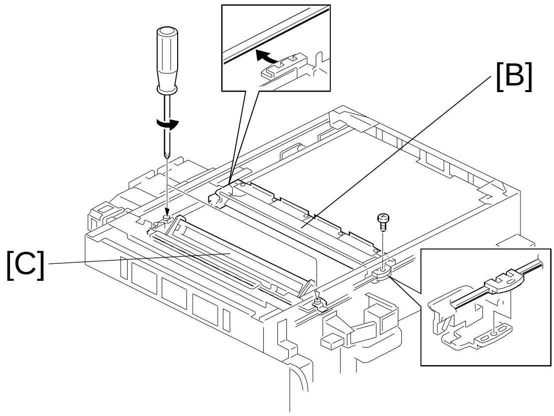
1. Remove the following parts:
   - Platen cover or DF
   - Left scale
   - Exposure glass
   - Top cover
   - Rear scale
   - Rear cover
   - Scanner HP. sensor
2. Manually move the 1st scanner to about the center, and loosen the belt clamps of the 1st and 2nd scanner.
3. Set the scanner adjustment tools [A] on both guide rails [B] as shown.

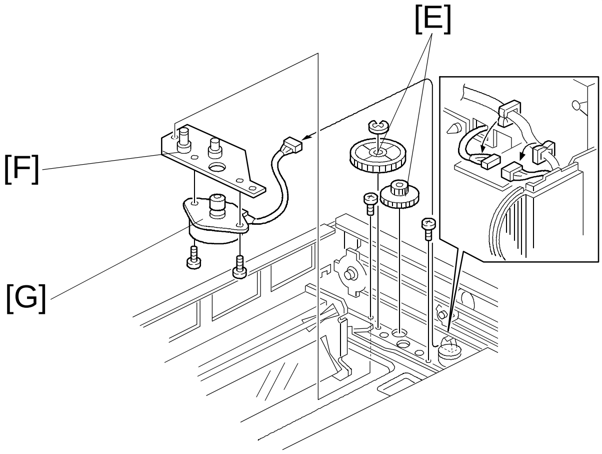
   NOTE: Scanner adjustment tools are available as a service part.
   P/N: A1539001 (See the parts catalog.)
4. Manually set the 1st [C] and 2nd [D] scanner on the pins of the scanner positioning bracket as shown.
5. Tighten the belt clamps.

   NOTE: To remove the scanner positioning brackets, gently lift up both scanner units and move them towards the home position.
6. Reassemble the machine and check the copy quality.

2.5 3RD SCANNER MOTOR REPLACEMENT

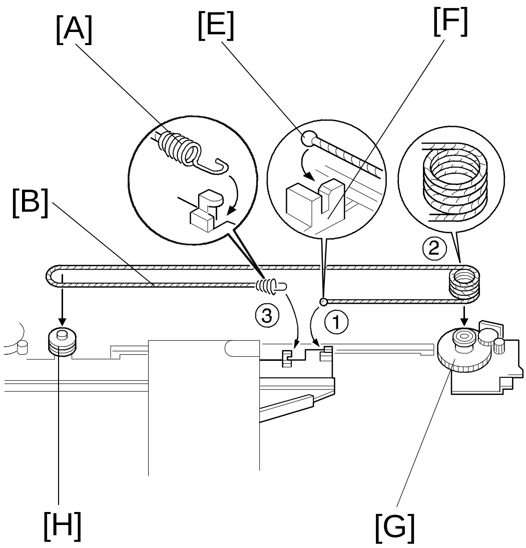


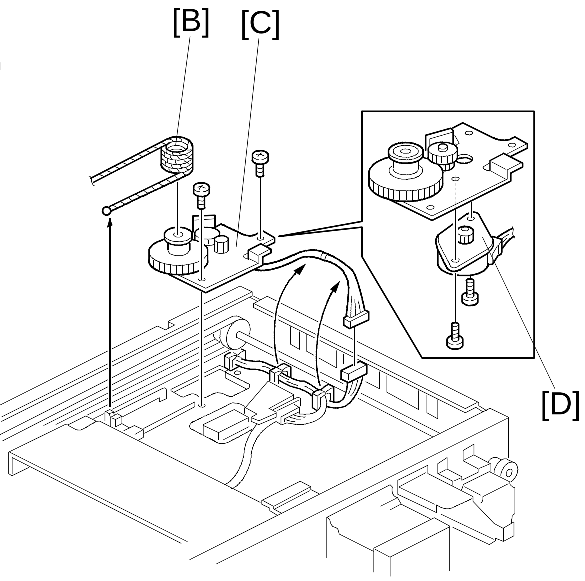




1. Remove the following parts:
    - Platen cover or DF
    - Left scale
    - Exposure glass
    - Top cover
    - Rear scale
    - Lens cover
    - Operation panel
    - Left scale bracket
    - Scanner HP. sensor bracket
2. Remove the upper right frame [A] (3 screws).
3. Remove the 1st scanner [B] from the scanner drive belt (1 screw).
4. Remove the 2nd scanner [C] from the scanner drive belt by loosening the 2 screws as shown.
5. Remove the front scanner guide rail [D] (1 spring plate).
6. Remove the 2 idle gears [E] (1 E-ring).
7. Remove the 3rd scanner motor bracket [F] (2 screws and 1 connector).
8. Replace the 3rd scanner motor [G] (2 screws).

2.6 LENS VERTICAL DRIVE MOTOR REPLACEMENT





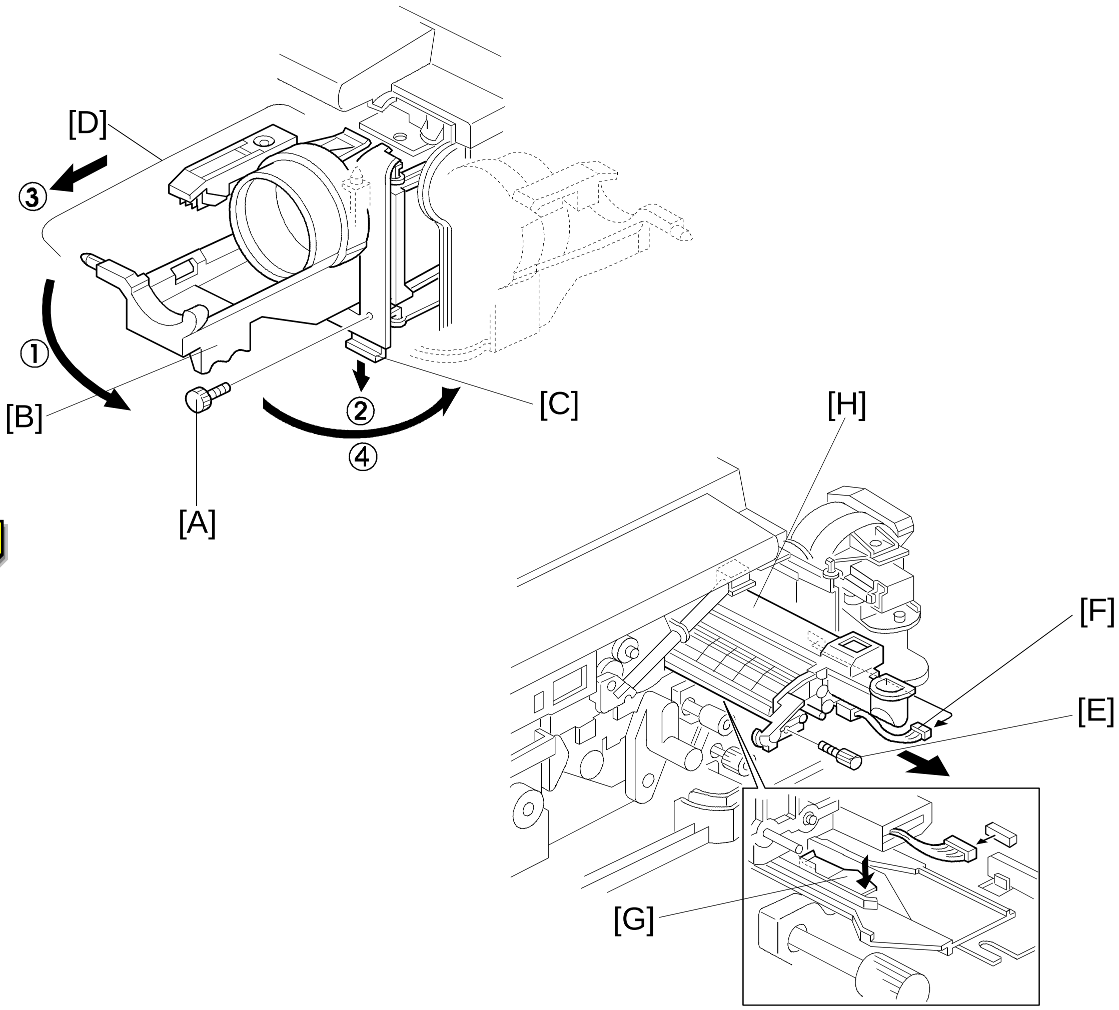
1. Perform steps 1 to 5 of the 3rd scanner motor replacement.
2. Remove the tension spring [A] and the lens drive wire [B].
3. Remove the lens vertical drive motor bracket [C] (2 screws, 2 clamps, and 1 connector).
4. Remove the motor [D] from the bracket (2 screws).

- Wire installation -

1. Place the bead [E] in the slot [F] and wind the drive wire four and a half times around the pulley [G].
2. Wrap the wire around the wire pulley [H] and attach the spring [A] to the bracket.

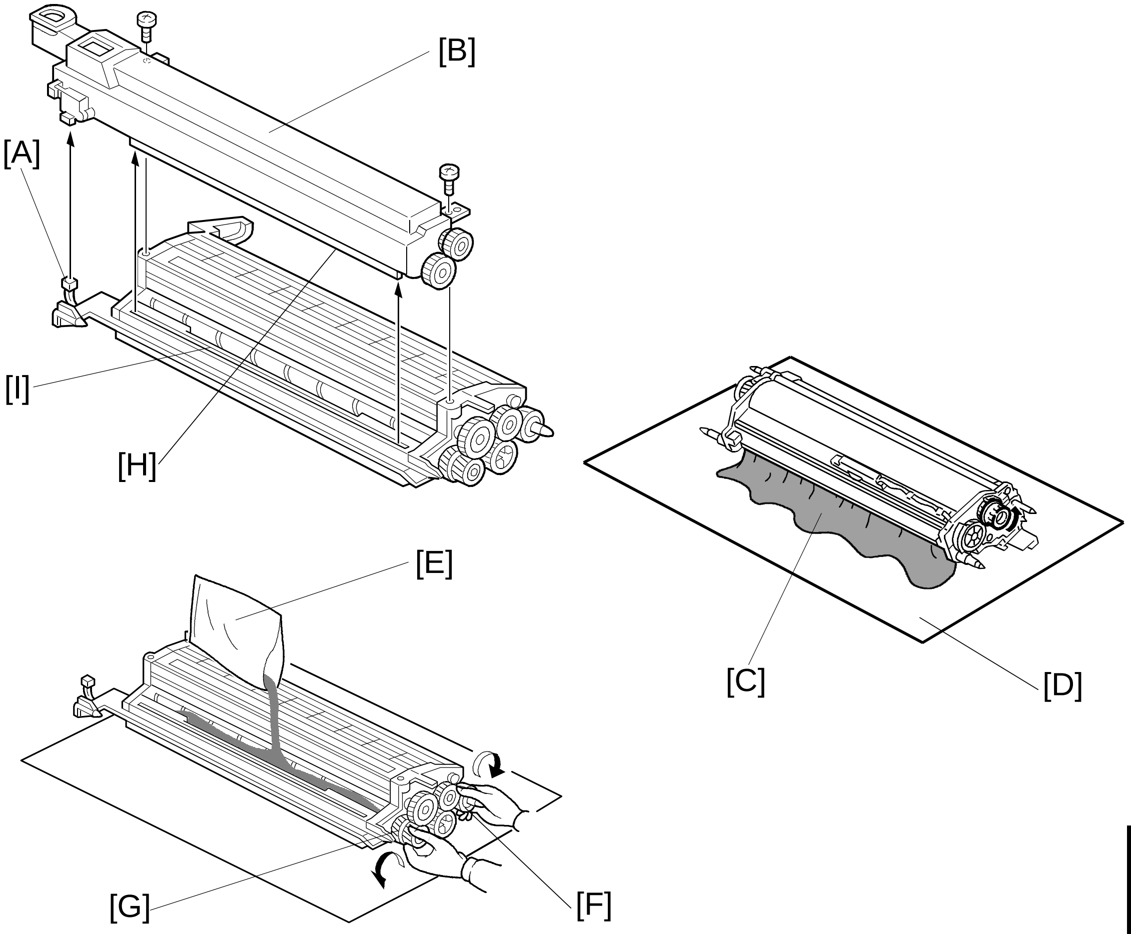
3. DEVELOPMENT AND TONER SUPPLY

3.1 DEVELOPMENT UNIT REMOVAL



1. Turn off the main switch.
2. Open the front cover.
3. Remove the knob screw [A].
4. ① Swing out bottle holder [B] and ② pull down the lock lever [C]. ③ Then slide out the bottle holder assembly [D] and ④ swing out the bottle holder assembly.
5. Remove the knob screw [E] and disconnect the connector [F].
6. Press down the development unit lock lever [G] and pull out the development unit [H]. Then place it on a clean sheet of paper.

3.2 DEVELOPER REPLACEMENT



1. Take out the development unit and place it on a clean sheet. (See Development Unit Removal.)
2. Disconnect the connector [A] and separate the toner supply unit [B] from the development unit (2 screws).
3. Turn over the development unit and empty all the developer [C] onto the sheet [D]. Make sure that no developer remains on the development roller or in the unit.

   NOTE: Dispose of the used developer in accordance with local regulations.

4. Pour about half a pack of developer [E] into the development unit. Then rotate the two outer gears [F] and [G] as shown to distribute the developer evenly. Then pour in all the remaining developer and rotate the gears again.

   NOTE: Do not rotate the gears in the other direction, or developer will spill out.

5. Remount the toner supply unit on the development unit (2 screws) and reconnect the connector.

   NOTE: Make sure that the positioning rib [H] sits in the groove [I].

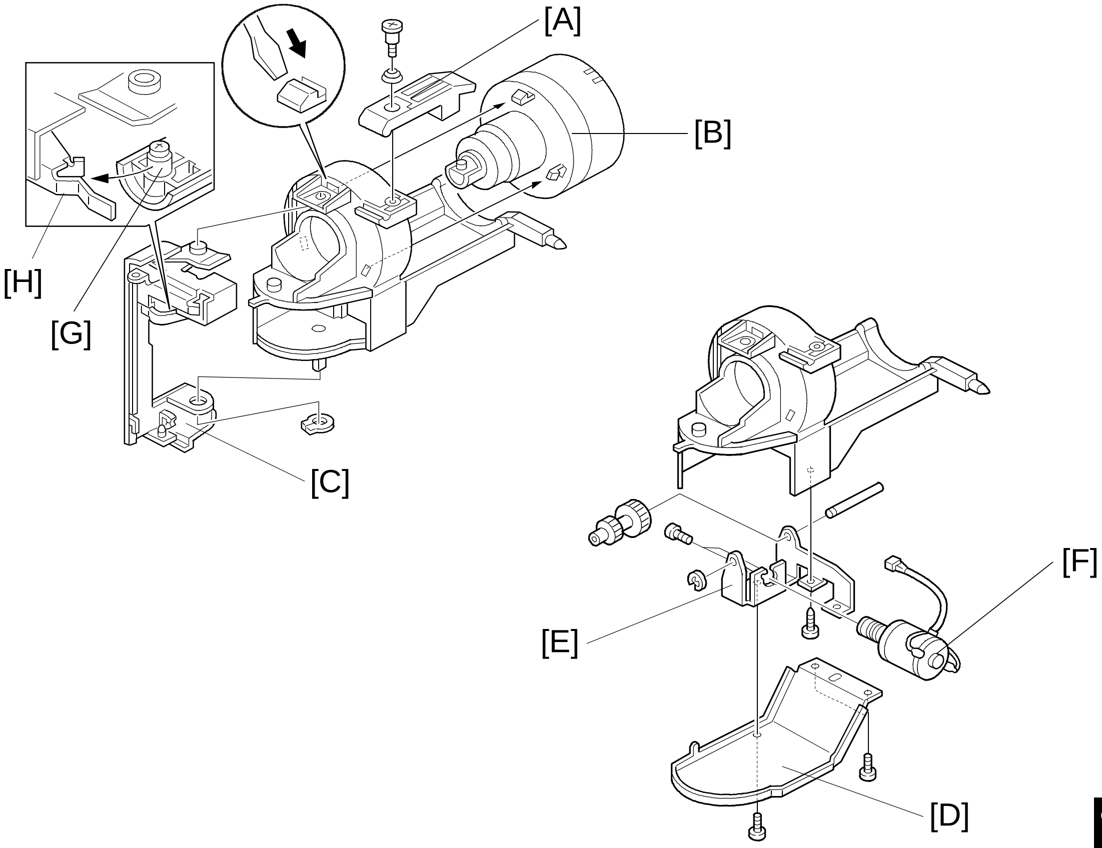
6. Install the development unit in the copier (1 knob screw and 1 connector).

7. Turn on the main switch, then perform the TD sensor initial setting for new developer using SP2-214.

! CAUTION

Never make any copy with the new developer before completing the TD sensor initial setting (SP2-214). Otherwise toner density control will be abnormal.

3.3 TONER SUPPLY MOTOR REPLACEMENT

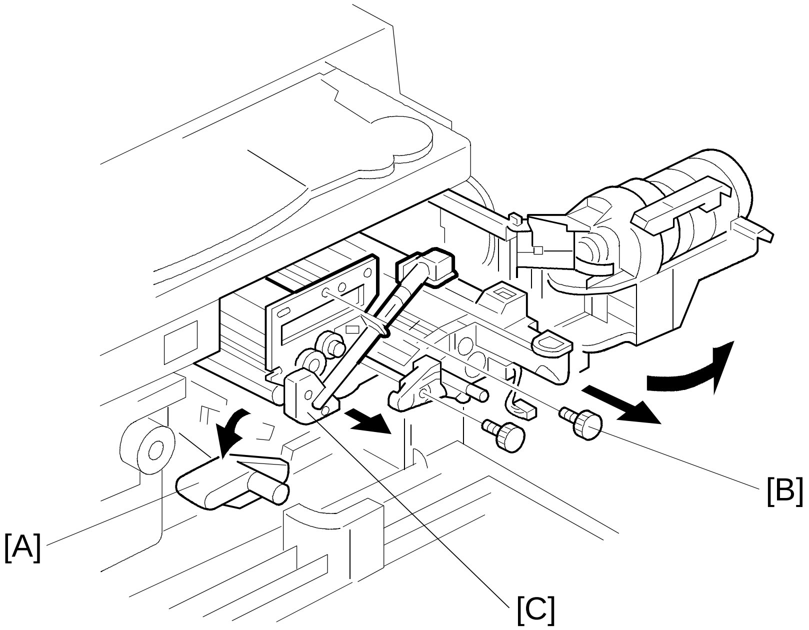


1. Turn off the main switch and open the front cover.
2. Swing out the bottle holder and remove the toner bottle.
3. Remove the bottle holder from the copier (1 screw, 1 knob screw, and 1 connector).
4. Remove the bottle locking lever [A] (1 shoulder screw and 1 spring).
5. Remove the bottle rotating cover [B] by releasing the three hooks.
6. Remove the hinge bracket [C] from the bottle holder (1 C-ring).
7. Remove the bottom cover [D] (3 screws).
8. Remove the toner supply motor bracket [E] (1 screw) and replace the toner supply motor [F] (1 E-ring and 1 gear shaft).

   NOTE: When reinstalling the hinge bracket on the bottle holder, make sure that the roller [G] slides into the notch [H] between the two guide rails as shown.

4. AROUND THE DRUM

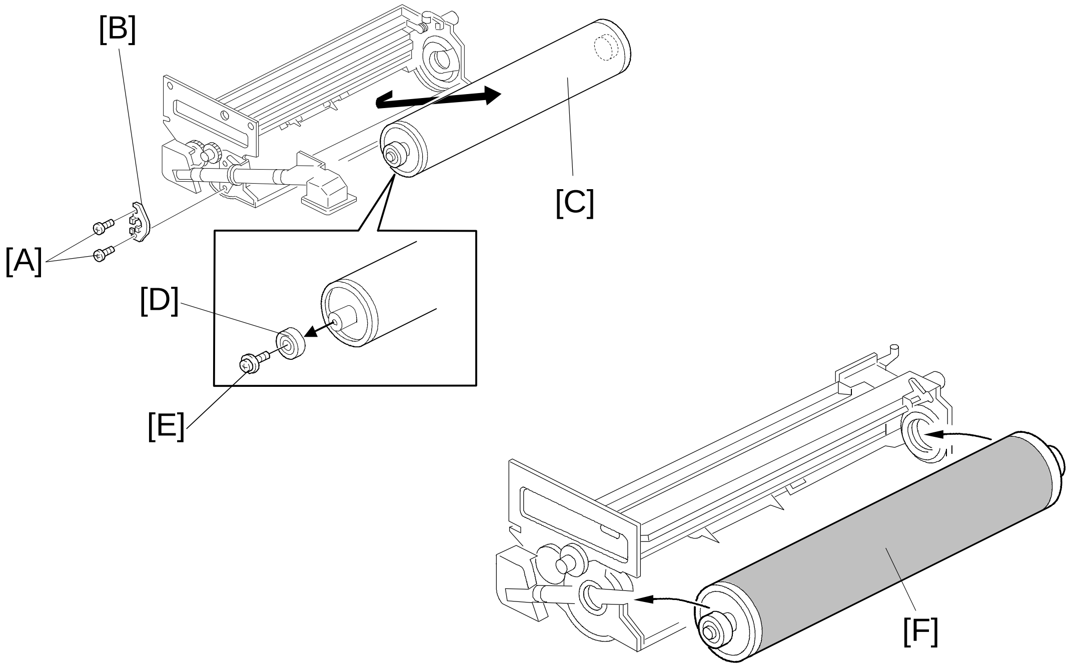
4.1 DRUM UNIT REMOVAL



1. Open the front cover and remove the development unit.
   (See Development Unit Removal.)
2. Turn the "A1" lever [A] counterclockwise to lower the transfer belt unit.
3. Remove the knob screw [B].
4. Remove the drum unit [C].

NOTE: 1. Insert a clean sheet of paper between the drum and the drum charge roller and wrap the drum up with the paper. Doing so prevents the drum charge roller from sticking to the drum. Also, the paper protects the drum from light fatigue.
2. Place the drum unit on a clean sheet of paper.

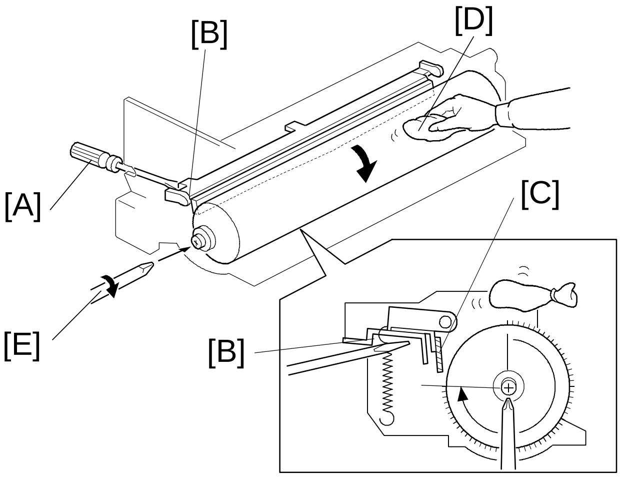
4.2 DRUM REPLACEMENT

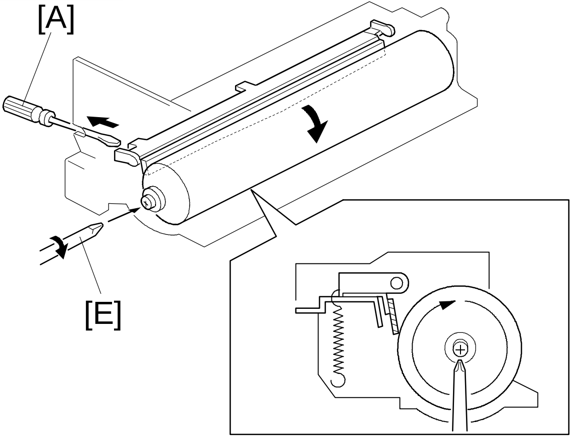


1. Pull out the drum unit from the copier. (See Drum Unit Removal.)
2. Remove the drum charge roller ass’y (see Drum Charge Roller Replacement).
3. Loosen the two screws [A] and remove the bearing holder [B].
4. While holding the front and rear ends of the drum, remove the drum [C] from the drum unit by lifting it up.
5. Remove the bearing [D] (1 screw [E]) from the old drum and install it on the new drum. Also, remove the protective sheet from the new drum.
6. Set the new drum [F] in the unit and install the bearing holder again (2 screws).

   NOTE: 1) When setting the drum in the unit, be careful not to strike it against the rail.

   2) Do not bend the bearing holder. Make sure the bearing holder is in contact with the bearing, as they are both used to ground the unit. If they are not in contact, solid black copies may occur.





7. Insert a small screwdriver [A] under the cleaning blade release lever [B] to release the cleaning blade [C].

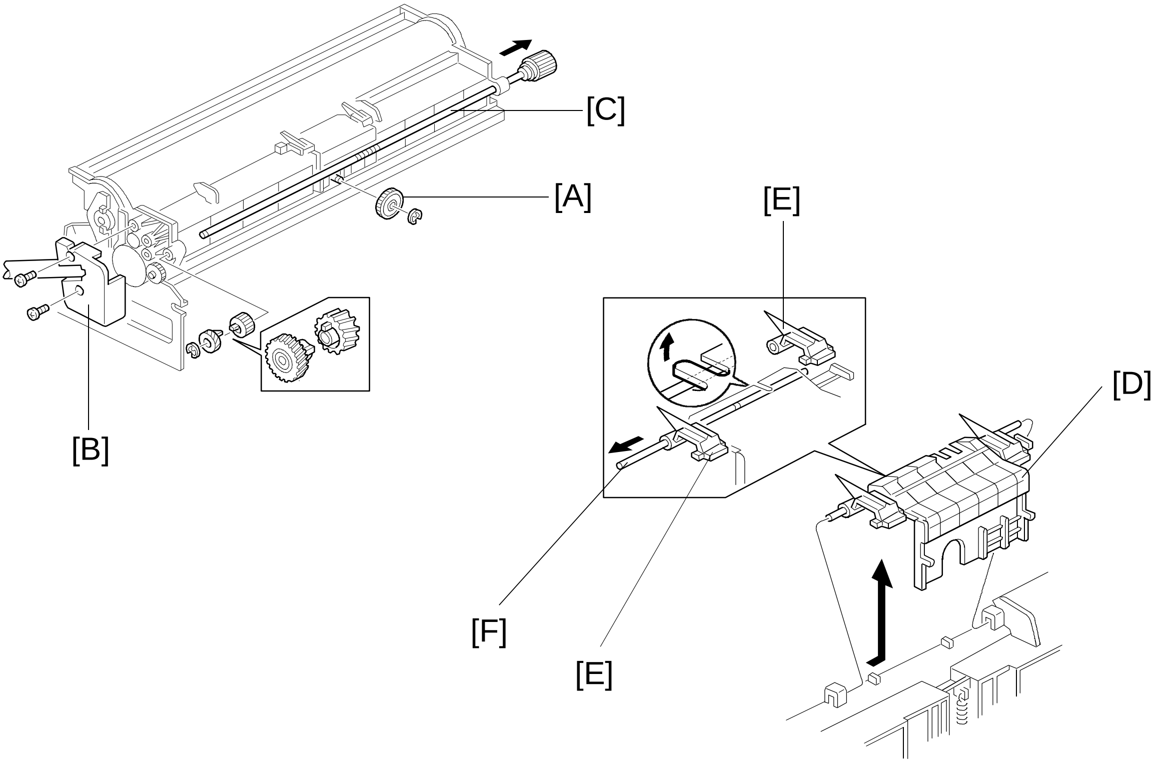
8. Apply setting powder [D] to the surface of the drum, and rotate the drum with another screwdriver [E] until the area covered with setting powder has almost reached the cleaning blade.

9. Remove the small screwdriver [A] so that the cleaning blade will press against the drum. Then rotate the drum clockwise with the screwdriver [E]. Check whether the drum rotates smoothly without catching the blade (if it does not, repeat steps 7 to 9).

10. Reinstall the drum charge roller ass’y on the drum unit (2 screws, 1 connector).

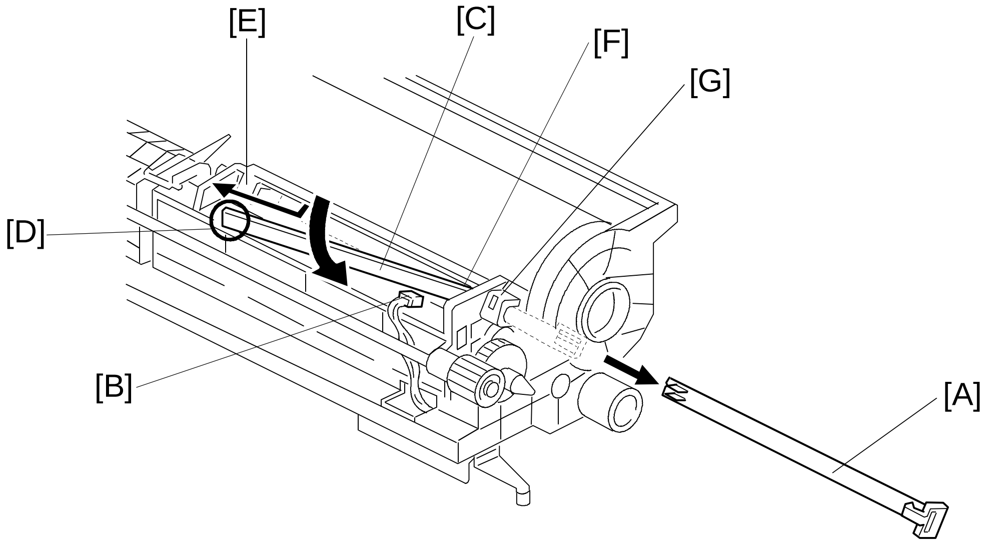
    NOTE: Before reinstalling the drum charge roller assy on the drum unit, be sure that no setting powder remains on the drum. If setting powder gets onto the drum charge roller, copy quality problems will occur.

4.3 PICK-OFF PAWL REPLACEMENT



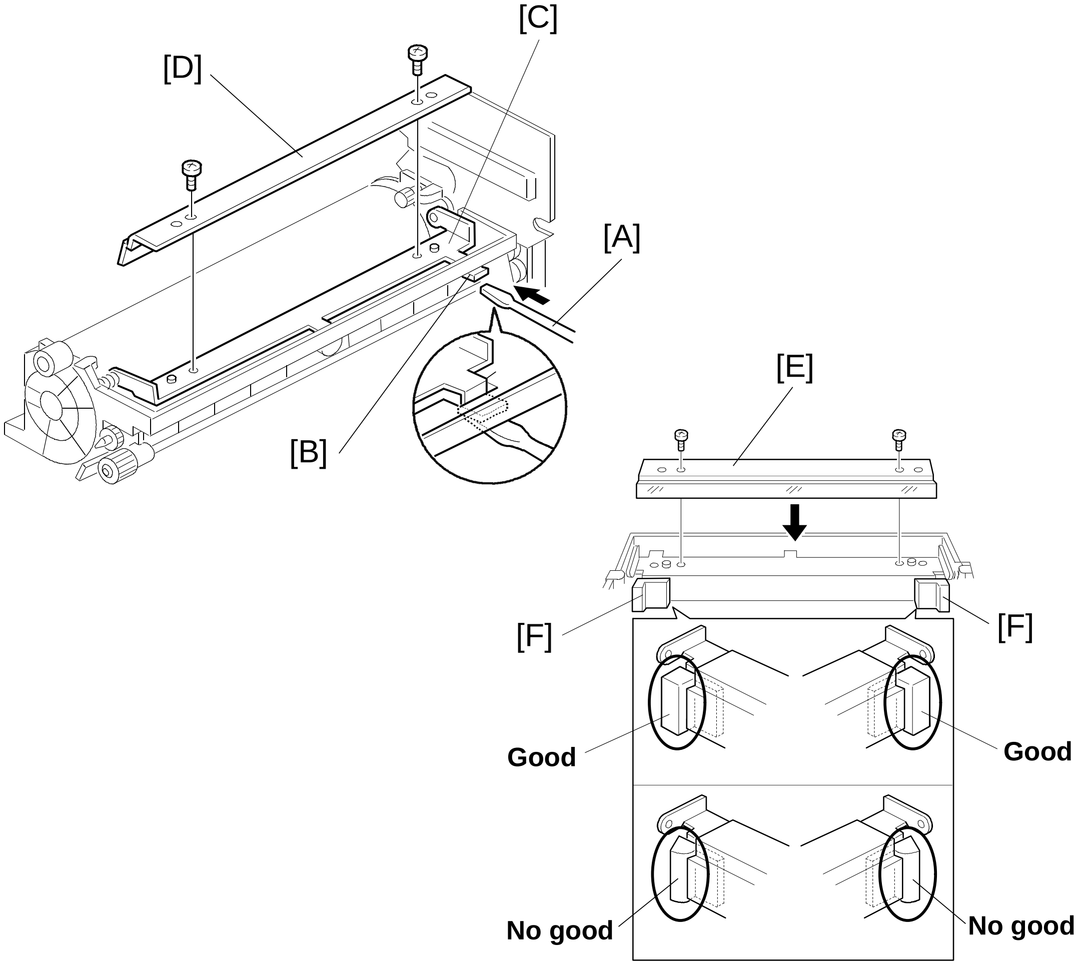
1. Remove the drum unit. (See Drum Unit Removal.)
2. Remove the gear [A] (one E-ring).
3. Remove the recycled toner transport coil ass’y [B] (2 screws).
4. Remove the shaft [C] (one E-ring and two gears).
5. Remove the pick-off pawl ass’y [D] while sliding it sideways.
6. Remove the pick-off pawls [E] (one shaft [F]).

4.4 ID SENSOR BOARD REPLACEMENT



1. Remove the drum unit. (See Drum Unit Removal.)
2. Remove the ID sensor supporter [A] (one snap pawl).
3. Disconnect the connector [B].
4. Pull the ID sensor board [C] sideways and remove the end [D] from the ID sensor board holder [E].
5. Remove the other end of ID sensor board [F] from the holder [G] while rolling the ID sensor board in the direction of the arrow as shown in the diagram.
6. Remove the ID sensor board.

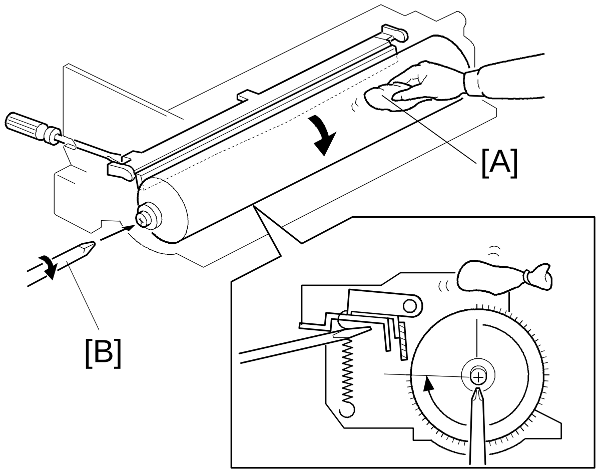
4.5 DRUM CLEANING BLADE REPLACEMENT

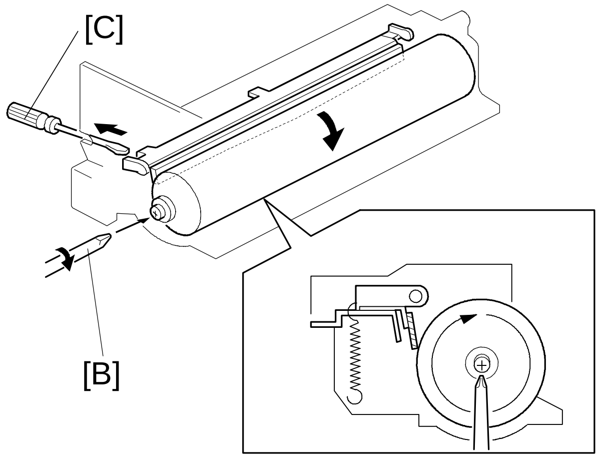


1. Remove the drum unit. (See Drum Unit Removal.)
2. Remove the drum charge roller ass’y (see Drum Charge Roller Replacement).
3. Insert a small screwdriver [A] under the cleaning blade release lever [B] to release the cleaning blade holder [C].
4. Remove the old cleaning blade [D] (2 screws).
5. Install the new cleaning blade [E] (2 screws).

   NOTE: 1. Check that there is no dust on the edge of the new cleaning blade.

   2. When installing the new cleaning blade, be sure not to deform the sponge seal [F] at both sides of the cleaning blade holder.





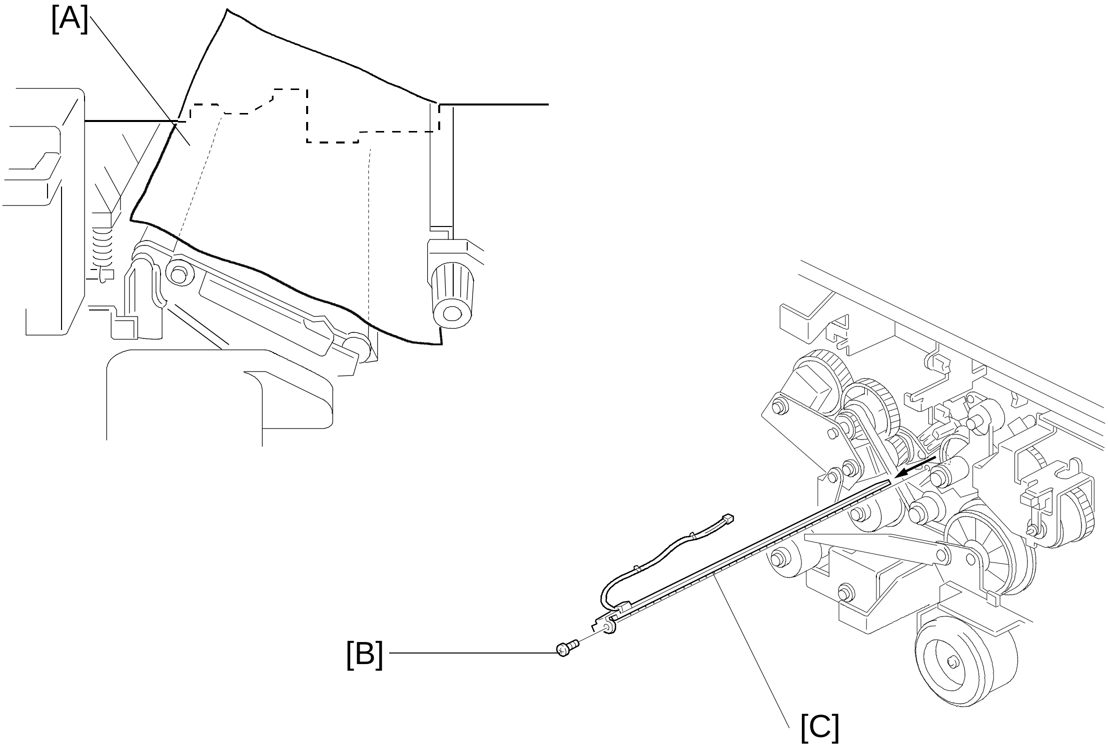
6. Apply setting powder [A] to the surface of the drum, and rotate the drum with another screwdriver [B] clockwise until the area covered with setting powder has almost reached the cleaning blade.

7. Remove the small screwdriver [C] so that the cleaning blade will press against the drum. Then rotate the drum clockwise with the screwdriver [B]. Check whether the drum rotates smoothly without catching the blade (if it does not, repeat steps 6 and 7).

8. Reinstall the drum charge roller ass’y on the drum unit (2 screws, 1 connector).

   NOTE: Before reinstalling the drum charge roller ass’y on the drum unit, be sure that no setting powder remains on the drum. If setting powder gets onto the drum charge roller, copy quality problems will occur.

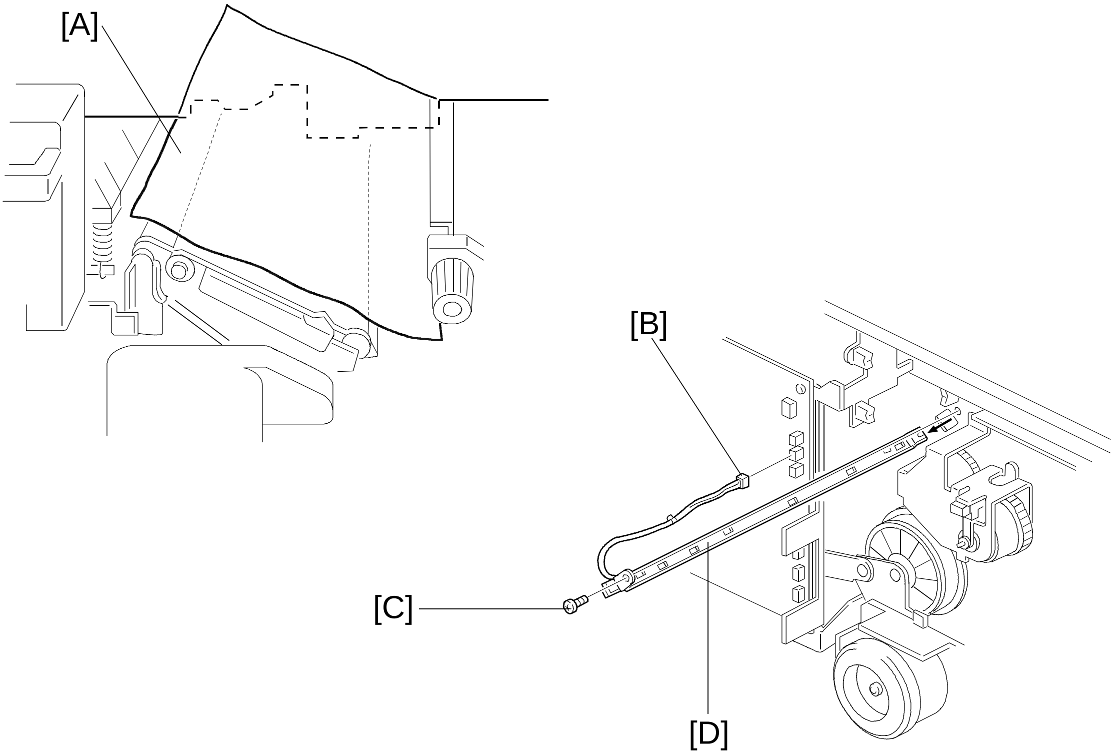
4.6 PTL BOARD REPLACEMENT



1. Remove the following parts:
    - Development unit
    - Drum unit
    - Main board
2. Lower the transfer belt unit and place a sheet of paper [A] over the transfer belt.

   NOTE: This step prevents the PTL board from damaging the transfer belt if it falls.
3. Remove the screw [B] and push the PTL board [C] halfway in from the front until its front end does not fall down.
4. Remove the PTL board [C] from the back of the copier.

4.7 QUENCHING LAMP REPLACEMENT



1. Remove the following parts:
    - Development unit
    - Drum unit

2. Lower the transfer belt unit and place a sheet of paper [A] over the transfer belt.

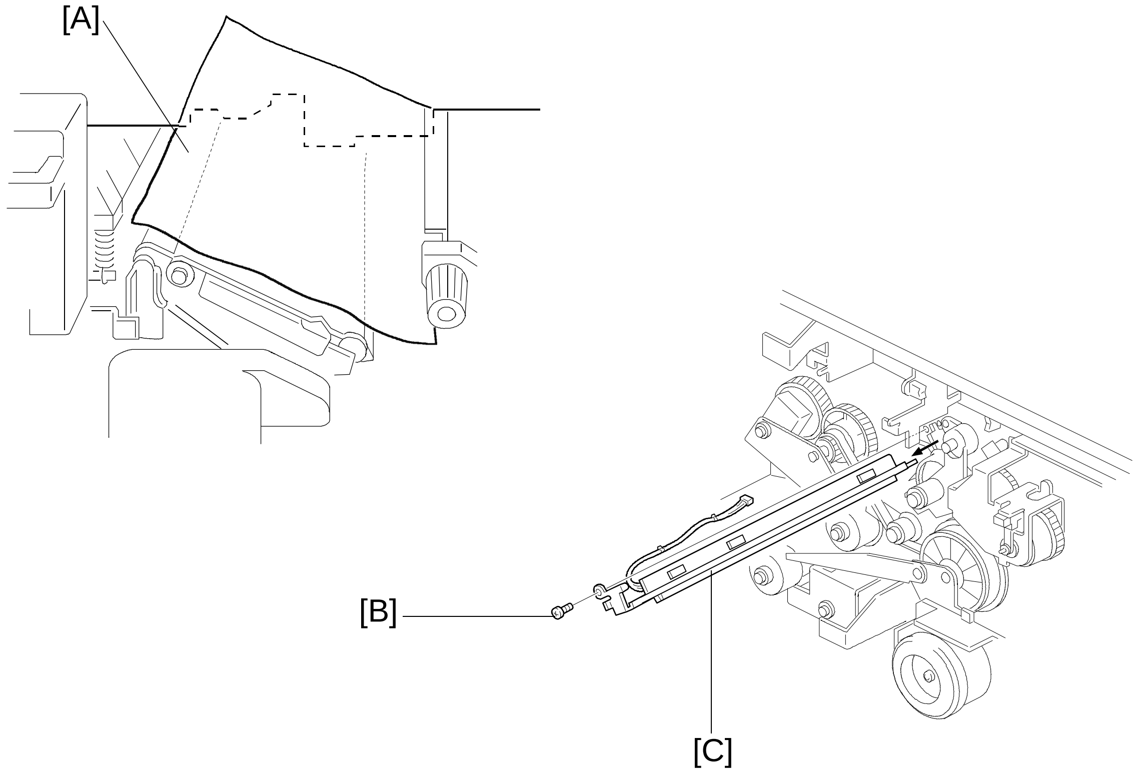
   NOTE: This step prevents the quenching lamp from damaging the transfer belt if it falls.

3. Disconnect the connector [B] (CN108) from the main board.

4. Remove the screw [C] and push the quenching lamp [D] halfway in from the front until its front end does not fall down.

5. Remove the quenching lamp [D] from the back of the copier.

4.8 ERASE LAMP REPLACEMENT



1. Remove the following parts:
    - Development unit
    - Drum unit
    - Main board

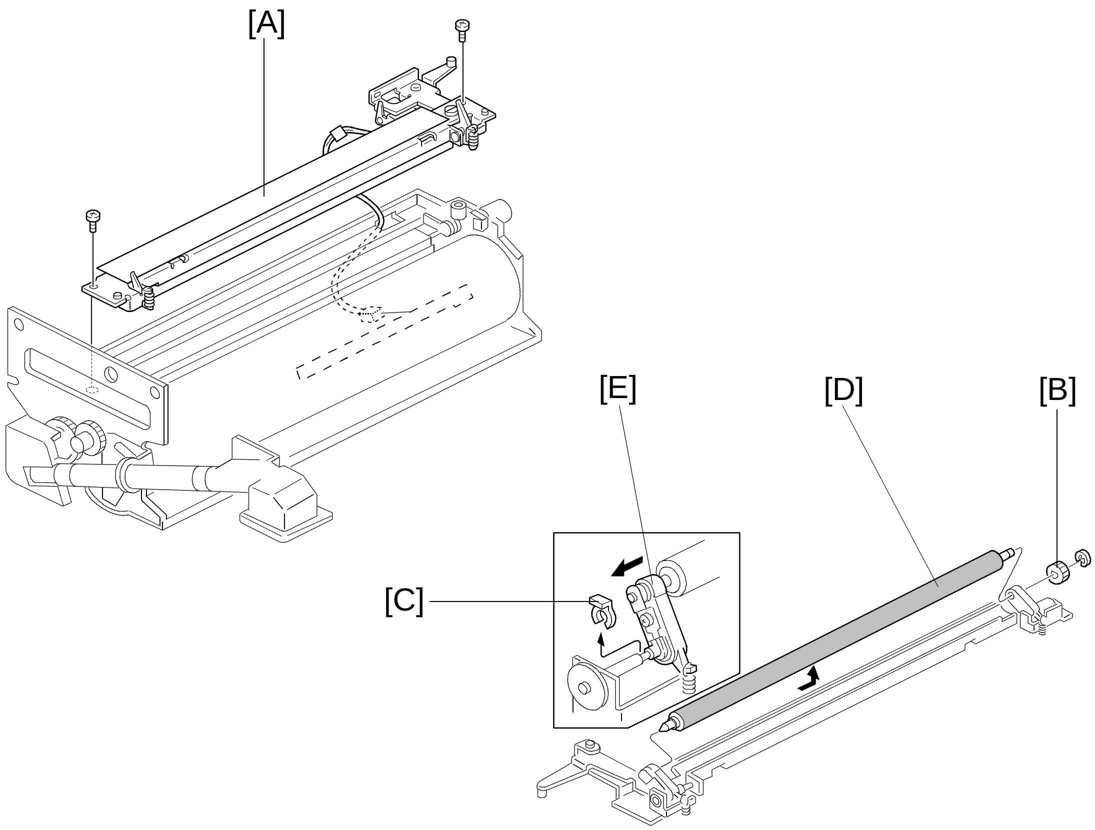
2. Lower the transfer belt unit and place a sheet of paper [A] over the transfer belt.

   NOTE: This step prevents the erase lamp from damaging the transfer belt if it falls.

3. Remove the screw [B] and push the erase lamp [C] halfway in from the front until its front end does not fall down.

4. Remove the erase lamp [C] from the back of the copier.

4.9 DRUM CHARGE ROLLER REPLACEMENT

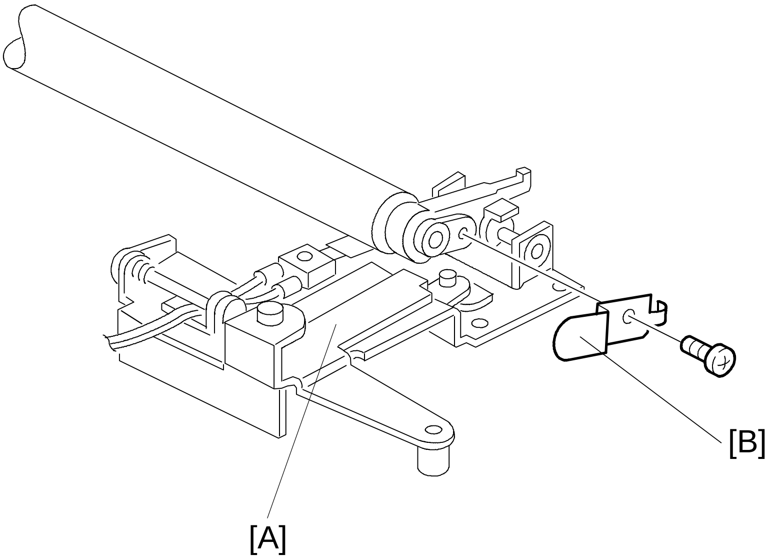


1. Remove the following parts:
   - Development unit
   - Drum unit
2. Remove the drum charge roller ass’y [A] (2 screws, 1 connector).
3. Place the drum charge roller ass’y on a clean sheet of paper as shown.
4. Remove the gear [B] (one E-ring) and remove the snap ring [C].
5. Remove the drum charge roller [D] while sliding the bearing [E] in the direction of the arrow as shown in the diagram.

NOTE: 1. Never touch the surface of the drum charge roller.

2. If there is any dirt on the surface of drum charge roller, wipe it off with a dry cloth or a special cloth for the drum charge roller. (The special cloth is available as a service part: A1539004) **Never use alcohol or water to clean the drum charge roller.**

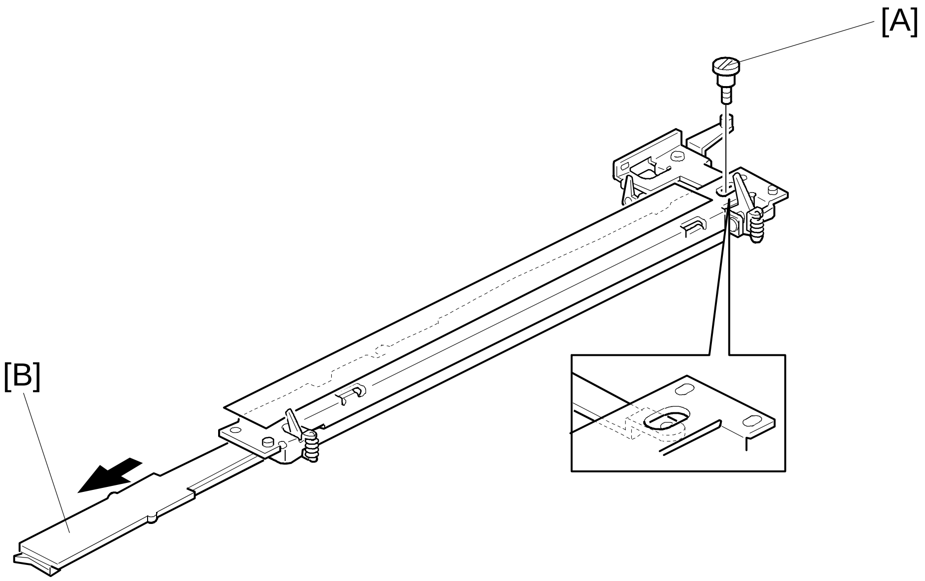
4.10 DRUM CHARGE ROLLER TERMINAL REPLACEMENT



1. Remove the drum charge roller ass'y.
2. Place the drum charge roller ass'y [A] on a clean sheet of paper.
3. Remove the drum charge roller terminal [B] (1 screw).

NOTE: 1. Never touch the surface of the drum charge roller.
2. If there is any dirt on the surface of the drum charge roller, wipe it off with a dry cloth or a special cloth for the drum charge roller. (The special cloth is available as a service part: A1539004.) **Never use alcohol or water to clean the drum charge roller.**

4.11 DRUM CHARGE ROLLER CLEANER REPLACEMENT

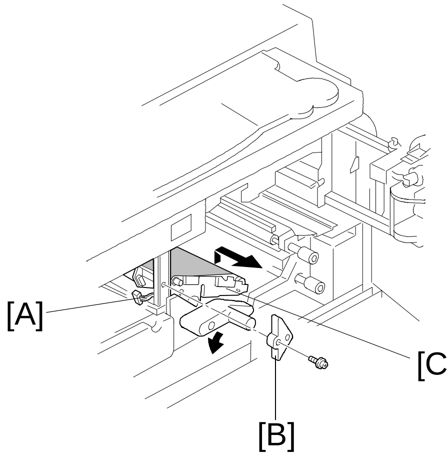


1. Remove the drum charge roller ass’y.
2. Remove the screw [A].
3. Pull out the drum charge roller cleaner [B].

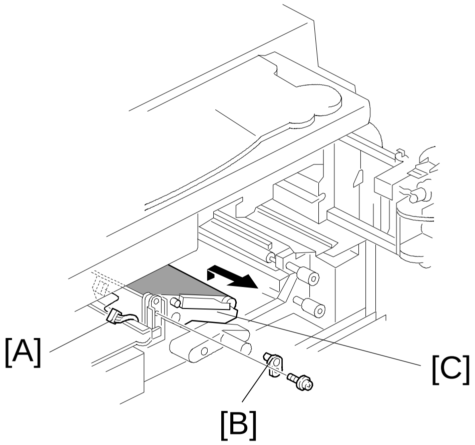
5. TRANSFER BELT UNIT

5.1 TRANSFER BELT UNIT REPLACEMENT

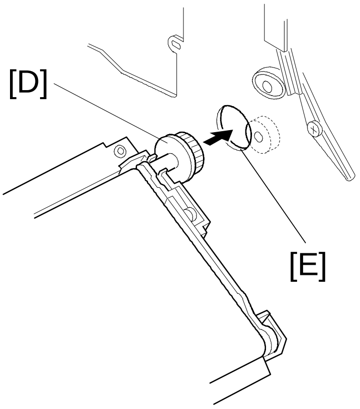
– A153, A155, and A156 copiers –



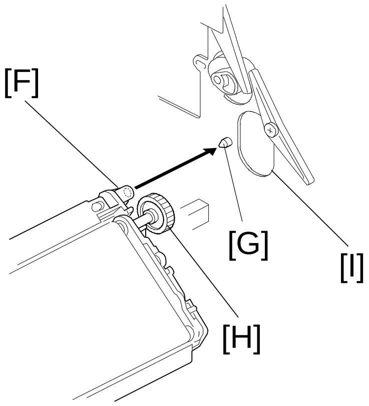
– A157, A159, and A160 copiers



– A153, A155, and A156 copiers –



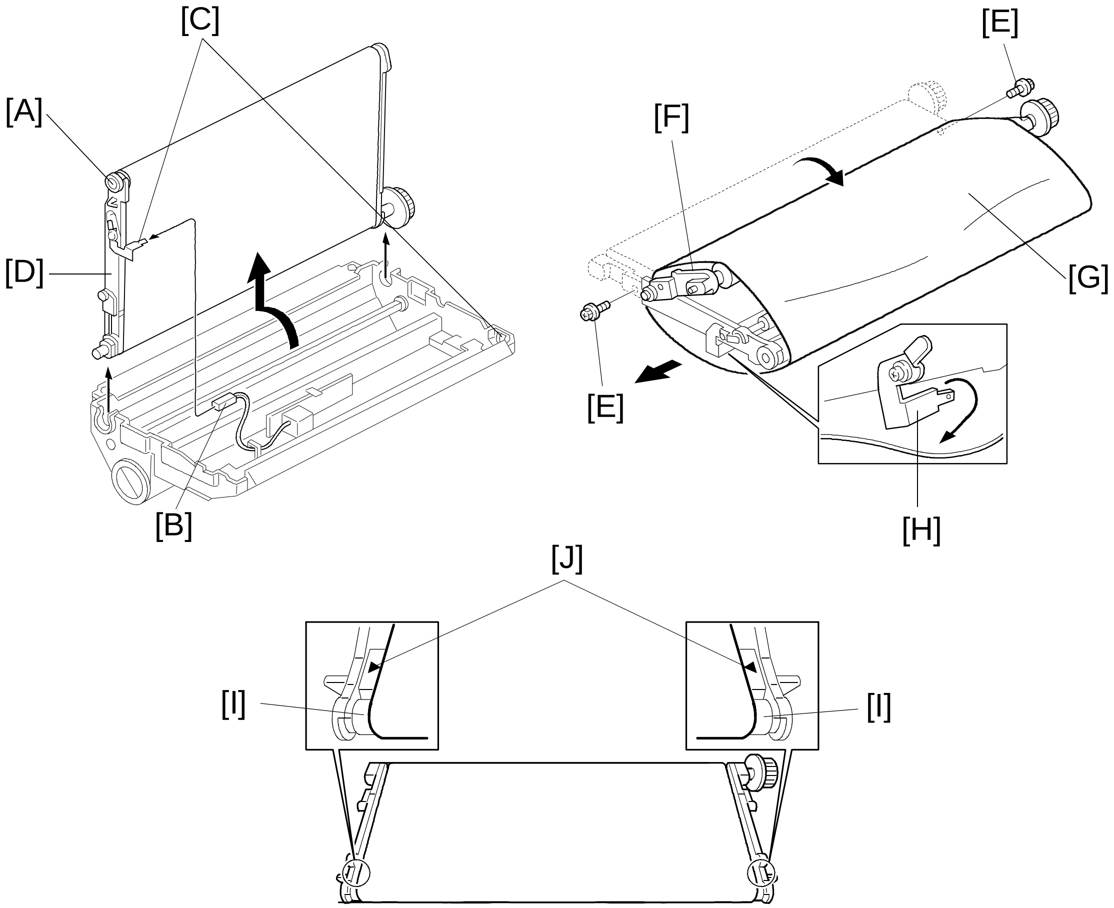
– A157, A159, and A160 copiers



1. Remove the development unit, drum unit, and fusing unit
2. Disconnect the connector [A].
3. Remove the transfer belt positioning plate [B] (one screw).
4. Remove the transfer belt unit [C].

   NOTE: Never touch the surface of the transfer belt.
5. **A153, A155, and A156 copiers:**
   When reinstalling the transfer belt unit, align gear [D] and opening [E].
   A157, A159, and A160 copiers:
   When reinstalling the transfer belt unit, align opening [F] and positioning pin [G] first. Then align gear [H] and opening [I].

5.2 TRANSFER BELT REPLACEMENT



1. Remove the transfer belt unit.
2. While raising the knob [A], disconnect the connector [B].

   NOTE: 1) Never touch the transfer belt.

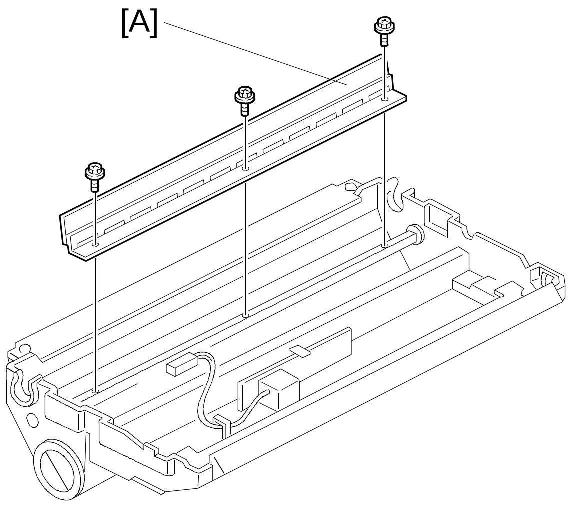
   2) Be careful not to bend the high voltage terminals [C].

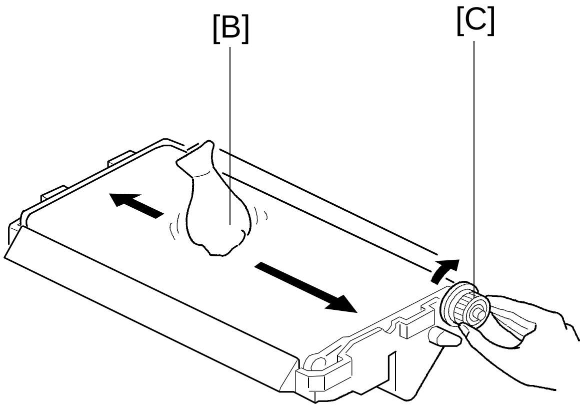
3. Turn the transfer belt ass’y [D] 90 degrees counterclockwise, then raise it and remove it.
4. Remove the screws [E] and turn the belt drive holder [F].
5. Replace the transfer belt [G].

   NOTE: Be careful not to bend the high voltage terminal [H].

6. Position the transfer belt at the center of the belt roller [I]. (Both marks [J] should be visible.)

5.3 TRANSFER BELT CLEANING BLADE REPLACEMENT

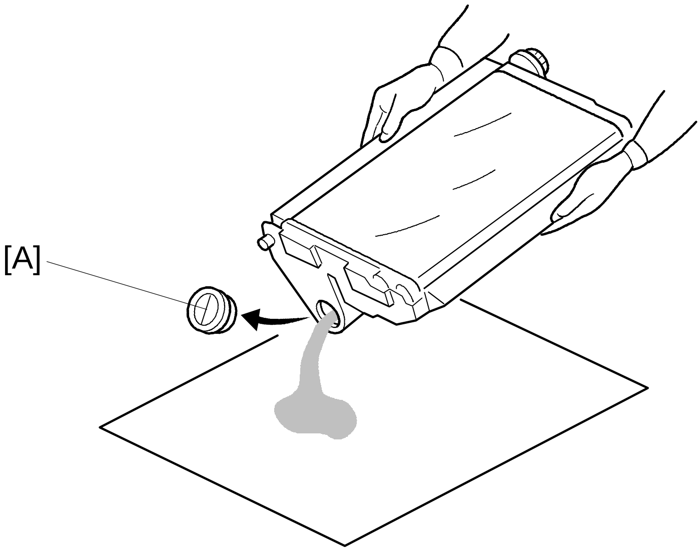




1. Remove the transfer belt ass’y. (See "Transfer Belt Unit Removal".)
2. Remove the transfer belt cleaning blade [A] (three screws).
3. Install the new transfer belt cleaning blade.
4. Reinstall the transfer belt ass’y in the transfer belt unit.
5. Apply setting powder [B] to the transfer belt.
6. Rotate the gear [C] clockwise to apply the setting powder evenly to the edge of the transfer belt cleaning blade.
7. Do steps 5 and 6 two or three times.

NOTE: Steps 5 and 6 prevent the transfer belt cleaning blade from catching the transfer belt.

5.4 DISPOSING OF COLLECTED TONER



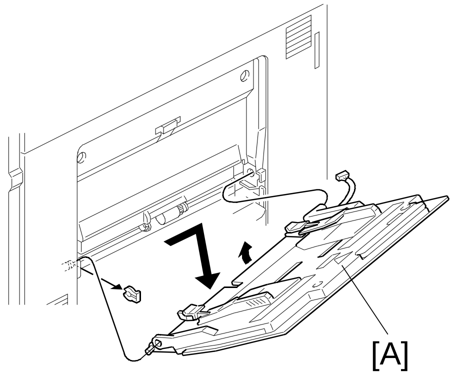
1. Remove the transfer belt unit. (See "Transfer Belt Unit Removal".)
2. Open the cap [A] and pour the collected toner slowly onto a sheet of paper so that the toner does not scatter.

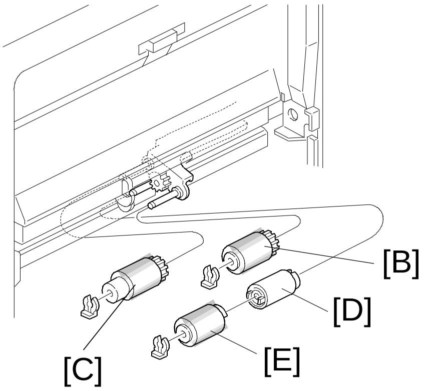
   NOTE: Never use the collected toner in the transfer belt unit for toner recycling.

3. Dispose of the toner in accordance with the local regulations.

6. PAPER FEED

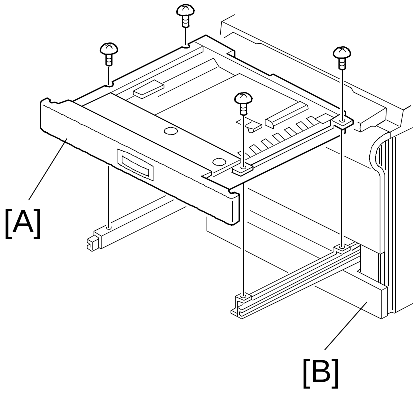
6.1 BY-PASS PICK-UP, FEED, AND SEPARATION ROLLERS, AND TORQUE LIMITER REPLACEMENT

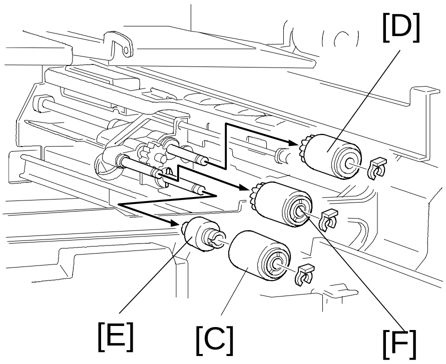




1. Remove the by-pass feed table [A] (1 clip, 1 connector).
2. Open the right door.
3. Remove the pick-up roller [B], feed roller [C], torque limiter [D], and the separation roller [E] (1 clip each).

6.2 PICK-UP, FEED, AND SEPARATION ROLLERS, AND TORQUE LIMITER REPLACEMENT (A153/A155/A156)

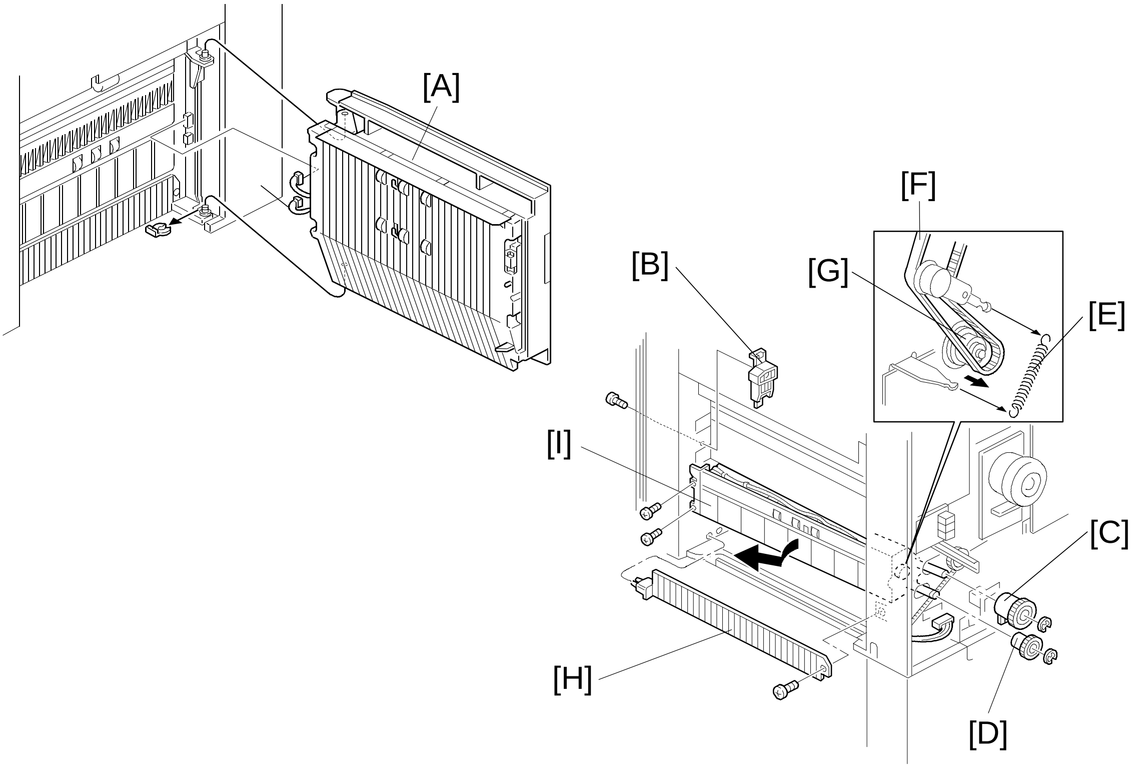




1. Remove the upper paper feed tray [A] or lower paper feed tray [B] (4 screws for each paper feed tray).
2. Remove the pick-up [C] and feed [D] rollers, torque limiter [E], and the separation roller [F] (1 clip each).

NOTE: After reinstalling the paper feed tray, perform the side-to-side registration adjustment (see Side-to-side Registration Adjustment).

6.3 LOWER PAPER FEED UNIT REPLACEMENT (A153/A155/A156)

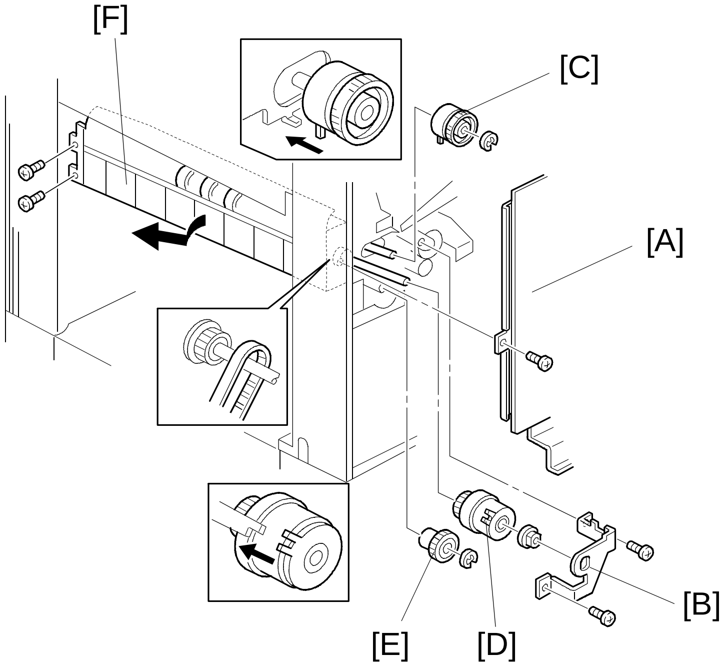


1. Remove the rear cover (see "Outer Cover Removal").
2. Remove the right door [A] (2 connectors, 1 clip) or the LCT unit (see "LCT Unit Removal").

Steps 3 through 5 are required for machines with an LCT.

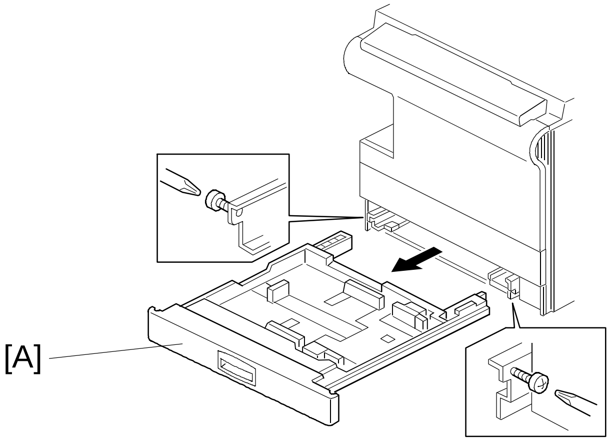
3. Remove the front cover (see "Outer Cover Removal").
4. Remove the right inner cover (see "Inner Cover Removal").
5. Remove the LCT set block [B] (1 screw).
6. Remove the lower paper feed clutch [C] (1 E-ring).
7. Remove the separation roller gear [D] (1 E-ring).
8. Remove the spring [E] and remove the timing belt [F] from the relay roller pulley [G].
9. Remove the vertical transport guide plate [H] (1 screw).
10. Remove the paper feed unit [I] (2 screws, 1 connector).

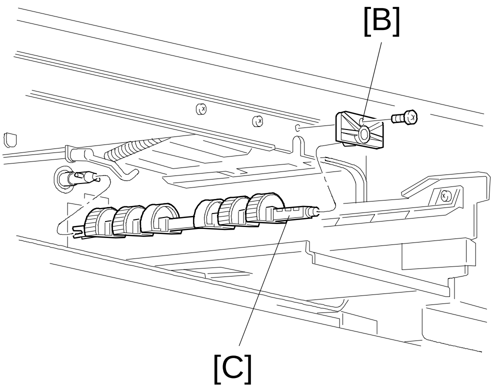
6.4 UPPER PAPER FEED UNIT REPLACEMENT (A153/A155/A156)

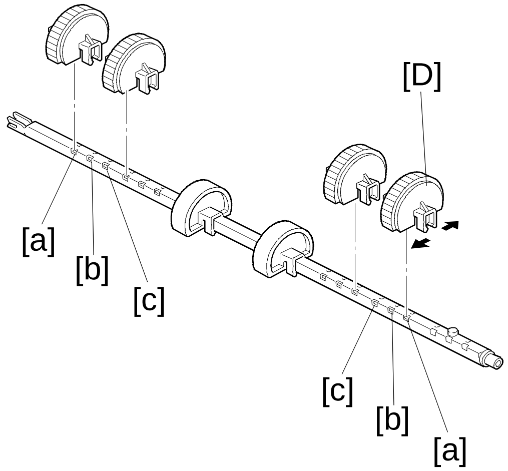


1. Remove the lower paper feed unit (see "Lower Paper Feed Unit Replacement").
2. Remove the main control board unit [A] (4 screws, all connectors).
3. Remove the bracket [B] (2 screws).
4. Remove the relay clutch [C] (1 connector, 1 bushing).
5. Remove the upper paper feed clutch [D] (1 E-ring, 1 connector).
6. Remove the separation roller drive gear [E] (1 E-ring).
7. Remove the upper paper feed unit [F] (2 screws, 1 connector).

6.5 PAPER FEED ROLLER REPLACEMENT (A157/A159/A160)



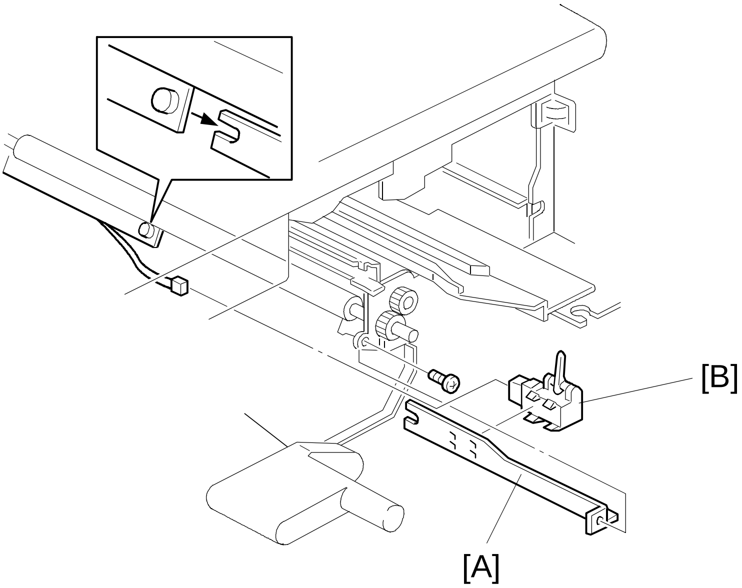




1. **A157/A159 copiers only:** Remove the front cover (see "Outer Cover Removal").
2. Remove the paper feed tray [A] (2 screws).
3. Remove the stopper bracket [B] (1 screw).
4. Remove the feed roller assembly [C].
5. Remove the feed roller [D].

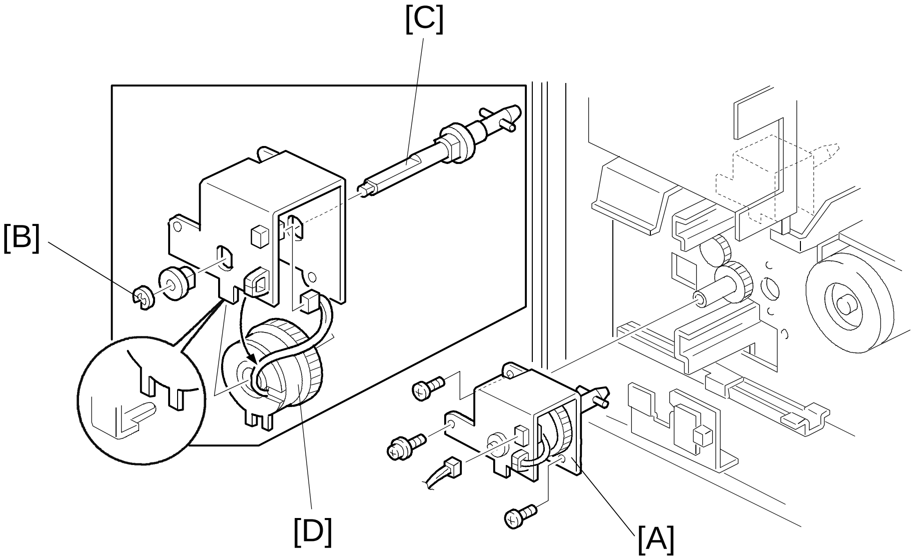
NOTE: 1) When installing the feed roller assembly, the flat side of the roller should be facing down.
2) The two rollers without rubber should be at the center of the shaft.
3) The factory-set roller position is [a].
4) Roller position [b] is only used in Japanese models.
4) Roller position [c] is especially useful for B size paper. When paper jam or non-feed occurs often with B size paper, change the feed roller position to [c].

6.6 REGISTRATION SENSOR REPLACEMENT



1. Remove the front cover (see "Outer Cover Removal").
2. Remove the lower right inner cover (see "Inner Cover Removal").
3. Remove the transfer belt assembly (see "Transfer Belt Unit Removal").
4. Remove the registration sensor bracket [A] (1 screw, 1 connector).
5. Remove the registration sensor [B].

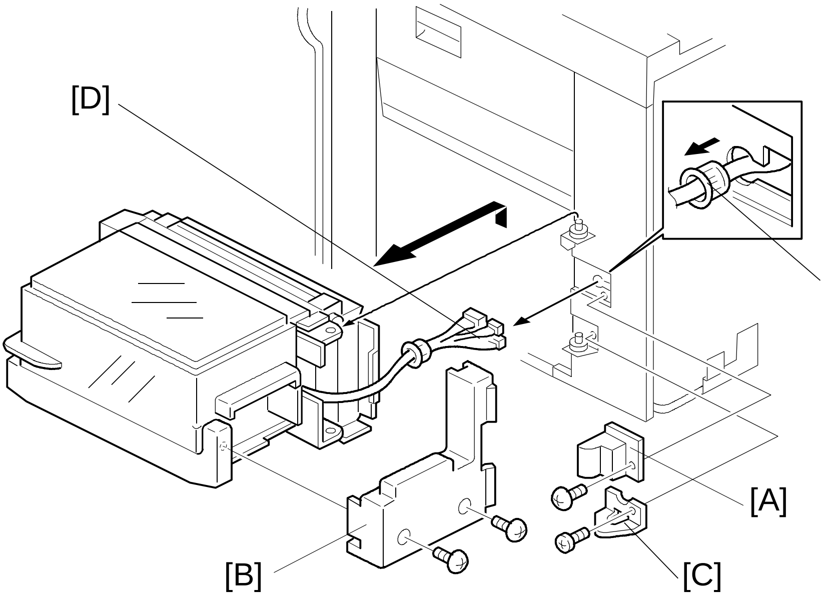
6.7 PAPER FEED CLUTCH REPLACEMENT (A157/A159/A160)



1. Remove the paper feed roller assembly (see "Paper Feed Roller Replacement").
2. Remove the rear cover (see "Outer Cover Removal").
3. Remove the paper feed clutch assembly [A] (3 screws, 1 connector).
4. Remove one E-ring [B] and the pull out the shaft [C].
5. Remove the paper feed clutch [D] (1 connector).

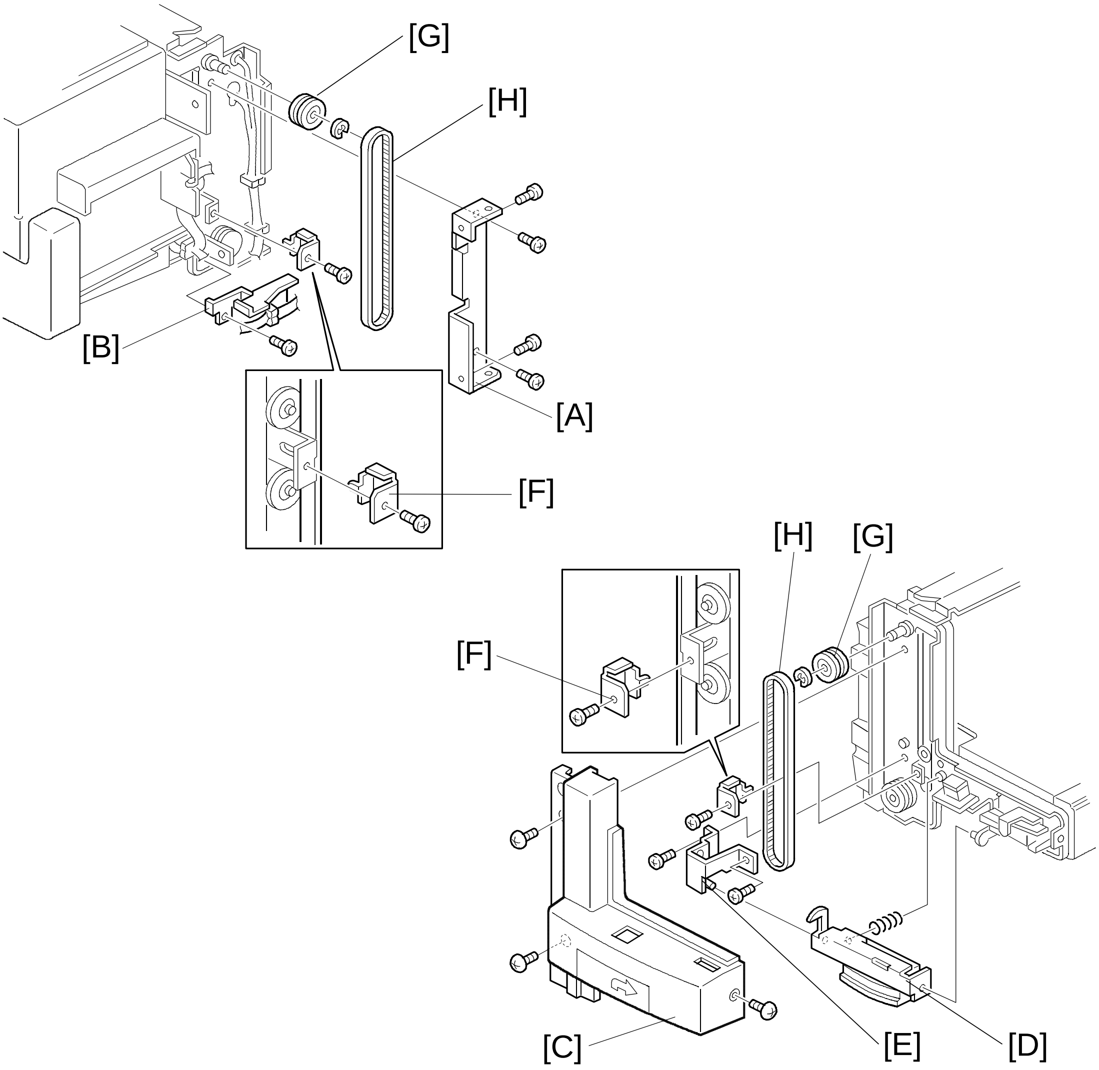
7. LCT

7.1 LCT UNIT REMOVAL



1. Remove the rear cover (see "Outer Cover Removal").
2. Remove the harness cover [A] (1 screw).
3. Remove the LCT’s rear cover [B] (2 screws).
4. Remove the stopper bracket [C] (1 screw).
5. Disconnect five connectors [D] and remove the harness bushing [E].
6. Remove the LCT.

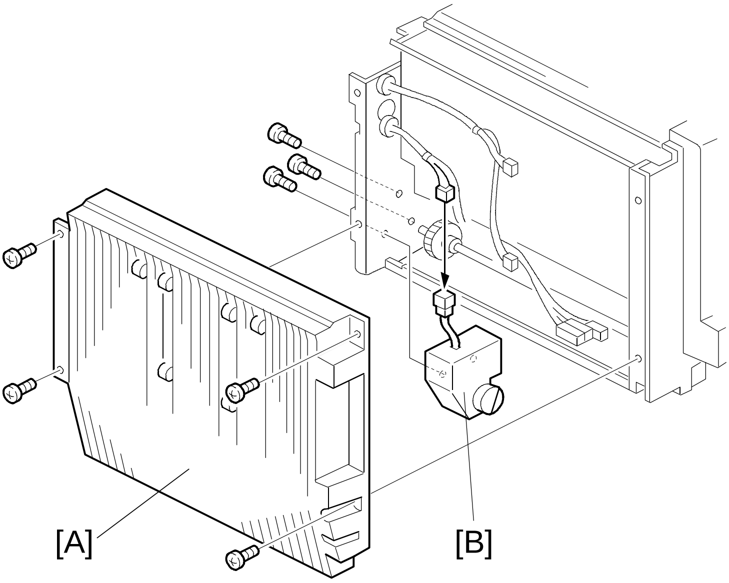
7.2 LCT DRIVE BELT REPLACEMENT



1. Remove the LCT unit (see "LCT Unit Removal").
2. Remove the upper belt cover [A] (4 screws).
3. Remove the lower belt cover [B] (1 screw).
4. Remove the front cover [C] (3 screws).
5. Remove the grip holding bracket [D] and grip bracket [E] (2 screws).
6. Remove the belt stoppers [F] (1 screw each).
7. Remove the upper pulley [G] and LCT drive belt [H] (1 E-ring each).

NOTE: When reinstalling the belt stoppers, make sure that the LCT bottom plate is at the bottom.

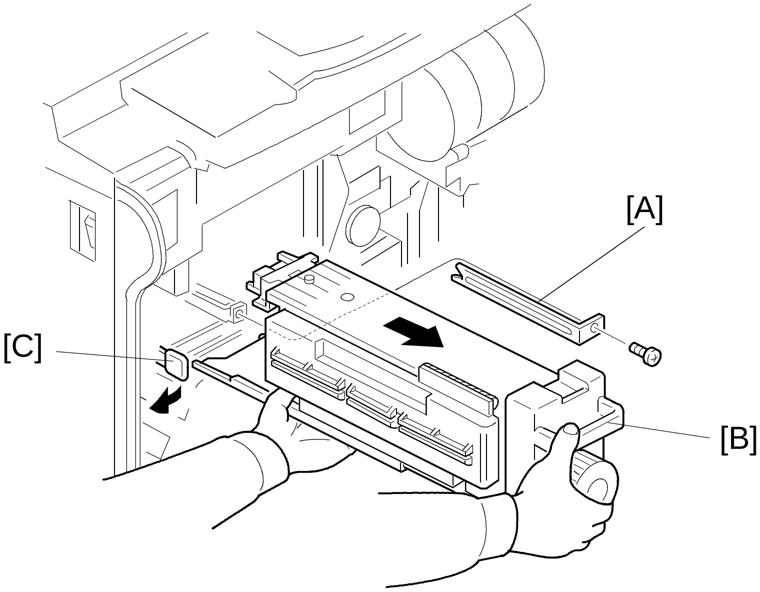
7.3 LCT MOTOR REPLACEMENT



1. Remove the LCT (see "LCT Unit Removal").
2. Remove the vertical transport guide [A] (4 screws).
3. Remove the LCT motor [B] (3 screws, 1 connector).

8. FUSING

8.1 FUSING UNIT REMOVAL

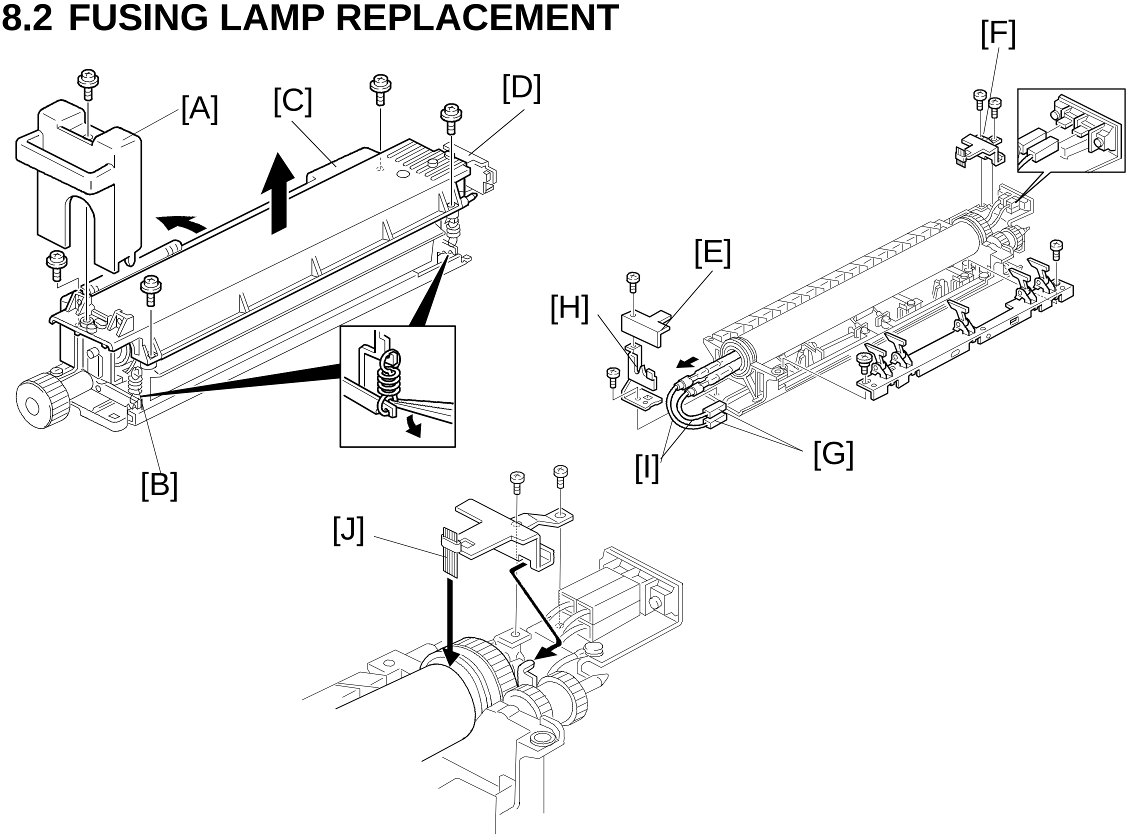


1. Open the front cover.
2. Remove the stopper bracket [A] (1 screw).
3. Hold the fusing unit cover [B] while pushing the release lever [C] to the left, and pull out the fusing unit until it stops.
4. Push the release lever again, and remove the fusing unit completely.

! CAUTION

Before completely removing the fusing unit, support the bottom of the fusing unit.

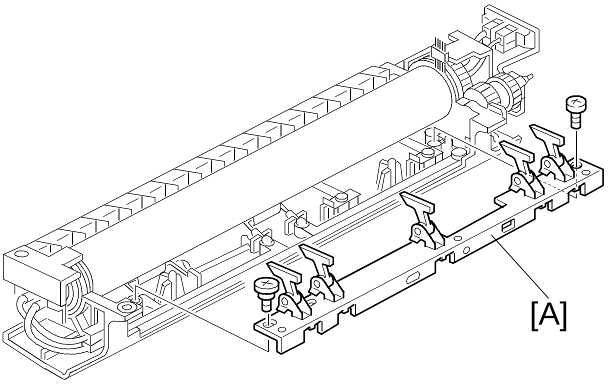
8.2 FUSING LAMP REPLACEMENT

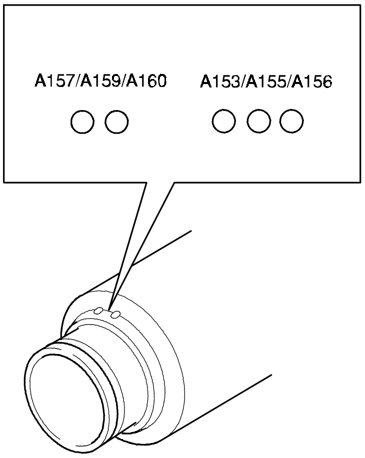


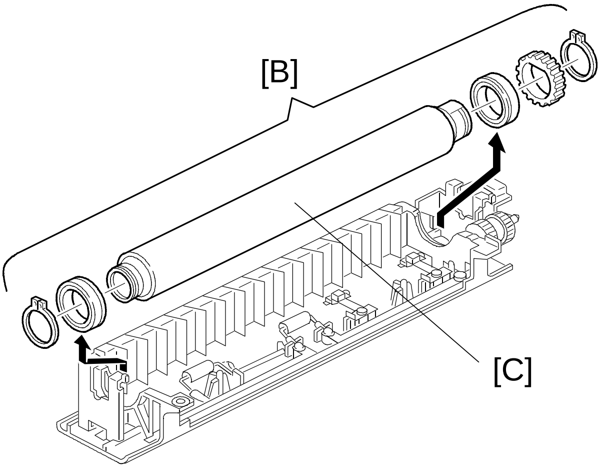
1. Remove the fusing unit (see "Fusing Unit Removal").
2. Remove the fusing front cover [A] (1 screw).
3. Remove the pressure springs [B].
4. Open the fusing exit cover [C] and remove the fusing upper unit [D] (4 screws).
5. Remove the upper front lamp holder [E] (1 screw).
6. Remove the rear lamp holder [F] (2 screws).
7. Disconnect the lamp connectors [G].
8. Remove the lower front lamp holder [H] (1 screw) and remove the two lamps [I].

NOTE: 1) Do not touch the fusing lamps with bare hands.
2) When reinstalling the rear lamp holder, make sure that the antistatic brush [J] contacts the hot roller and pressure roller shown.
3) The standard pressure spring position is at the upper position.

8.3 HOT ROLLER REPLACEMENT







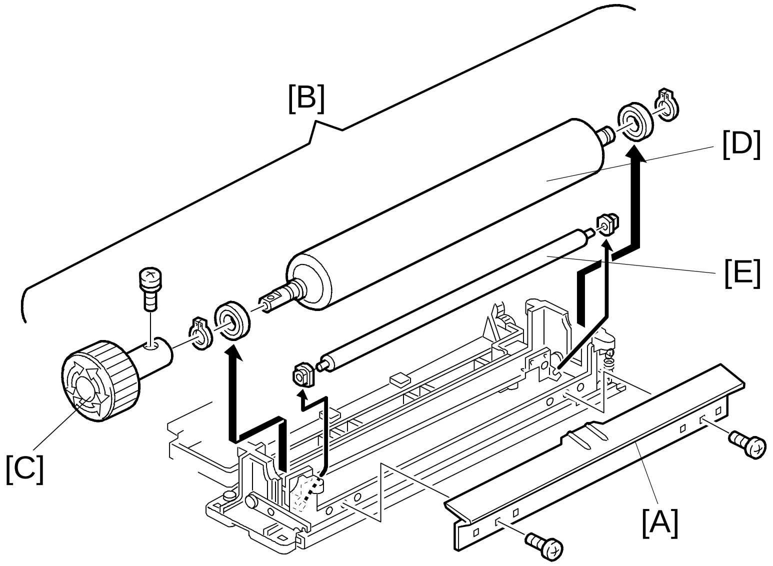
1. Remove the fusing lamps (see "Fusing Lamp Replacement").
2. Remove the hot roller stripper bracket [A] (2 screws).
3. Remove the hot roller assembly [B].
4. Replace the hot roller [C] (2 C-rings, 1 gear, 2 bearings).

NOTE: 1) Before installing the hot roller, peel off 3 cm (1 inch) from both ends of the protective sheet on the new one.
2) The standard pressure spring position is at the upper position.

! CAUTION

The hot rollers for the A153/155/156 are different from the hot rollers for the A157/159/160. To distinguish between the two types of hot roller, look at the end of the roller. The A153/155/156 roller has three small dot-like indentations at one end, and the A157/159/160 has two. Do not confuse the two, or the machine may be damaged.

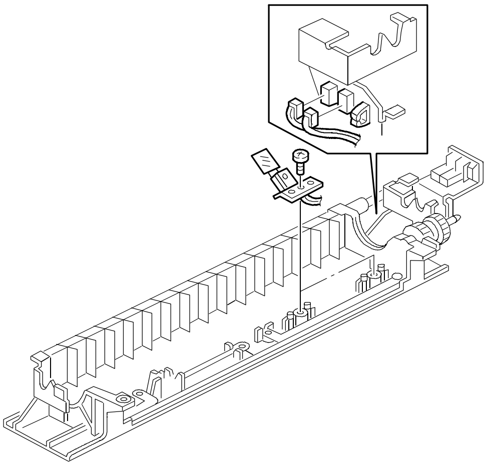
8.4 PRESSURE ROLLER AND CLEANING ROLLER REPLACEMENT



1. Remove the fusing unit (see "Fusing Unit Removal").
2. Remove the pressure springs and remove the lower fusing unit (4 screws).
3. Remove the lower fusing entrance guide [A] (2 screws).
4. Remove the pressure roller assembly [B].
5. Remove the fusing knob [C]
6. Replace the pressure roller [D] (2 C-rings, 2 bearings).
7. Replace the cleaning roller [E] (2 bushings).

NOTE: 1) When reinstalling the fusing entrance guide, tighten the screws while pushing the guide plate up to the upper position (for standard or thin paper). For thick paper, let the entrance guide plate drop to the lowest position.
2) The standard pressure spring position is at the upper position.

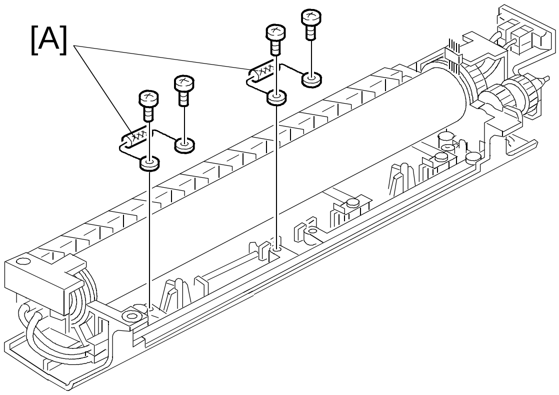
8.5 THERMISTOR REPLACEMENT



1. Remove the fusing unit (see "Fusing Unit Removal").
2. Remove the hot roller assembly (see "Hot Roller Replacement").
3. Remove the thermistor [A] (1 screw, 1 connector).

NOTE: The standard pressure spring position is at the upper position.

8.6 THERMOFUSE REPLACEMENT

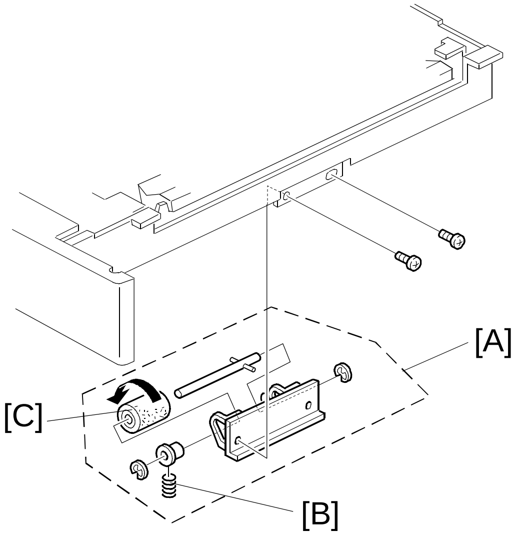


1. Remove the fusing unit (see "Fusing Unit Removal").
2. Remove the pressure springs and remove the upper fusing unit (4 screws).
3. Remove the thermofuse [A] (2 screws).

NOTE: 1) When replacing the thermofuse, make sure that you do not damage the hot roller.
2) The standard pressure spring position is at the upper position.

9. DUPLEX UNIT

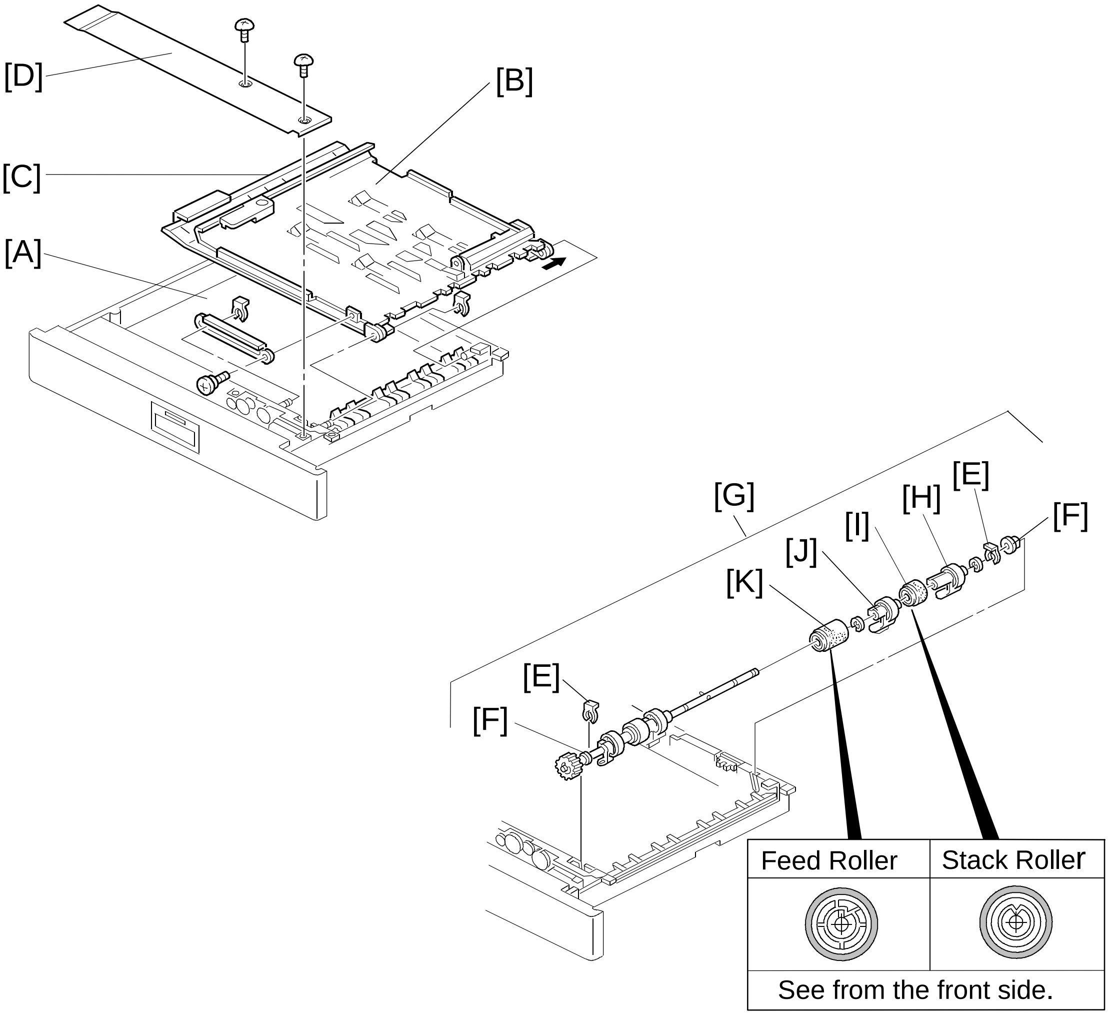
9.1 FRICTION ROLLER REPLACEMENT



1. Remove the duplex unit (4 screws).
2. Remove the separation roller assembly [A] (2 screws).
3. Remove the springs [B].
4. Remove the friction roller [C] (2 E-rings, 2 bushings).

NOTE: This friction roller has a one-way clutch. Be sure to install the roller so that it rotates in the direction of the arrow (see the illustration).

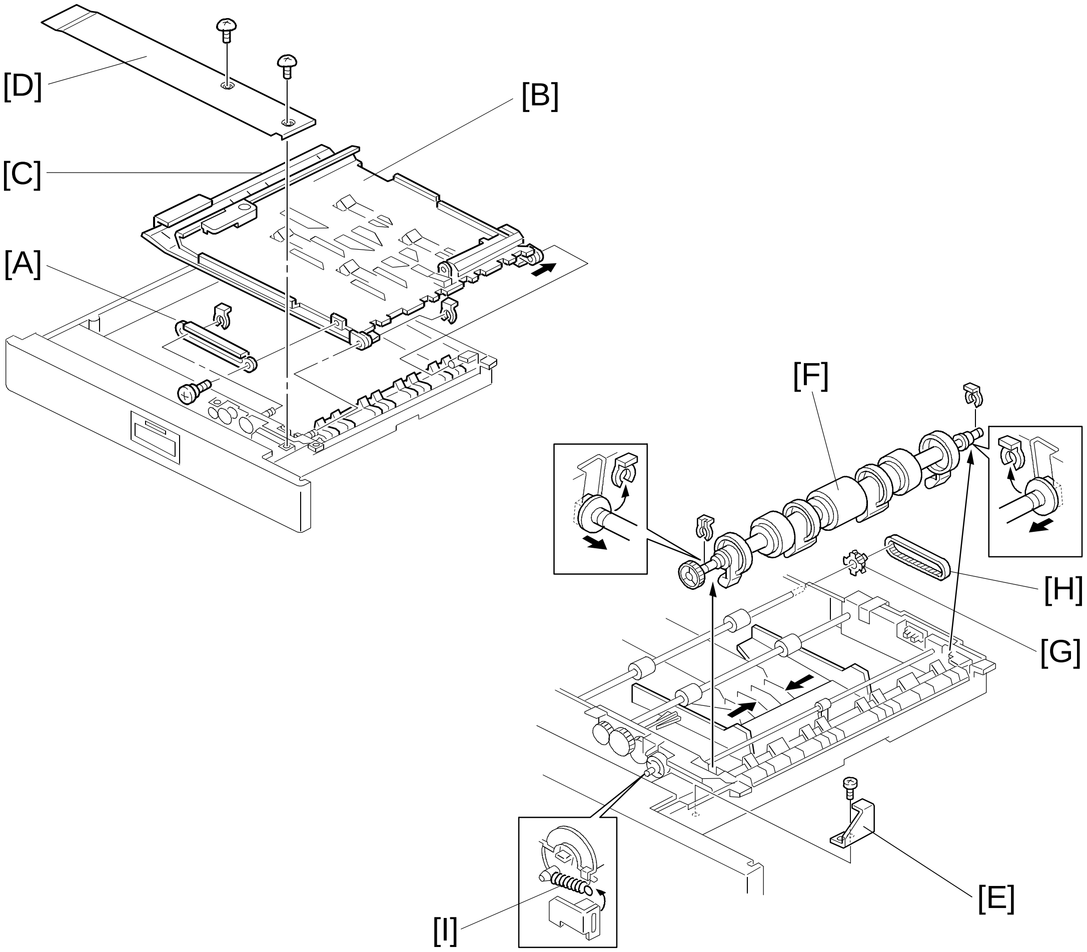
9.2 DUPLEX FEED ROLLER REPLACEMENT


[D]
[B]
[C]
[A]
[G]
[E]
[H]
[I]
[F]
[J]
[K]
[E]
[F]
Feed Roller
Stack Roller
See from the front side.

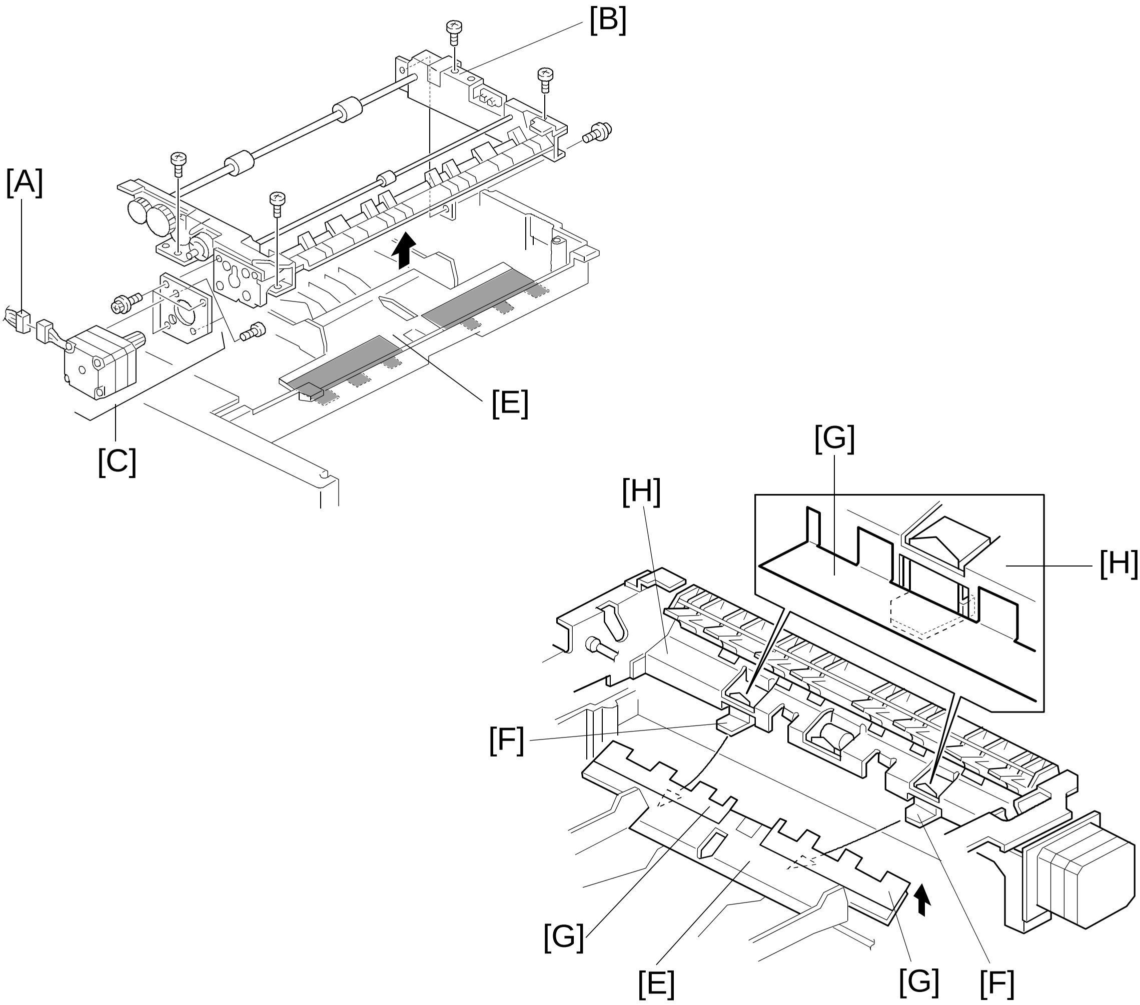
1. Pull out the duplex unit.
2. Remove the link bracket [A] (1 screw, 1 clip).
3. Remove the upper guide plate [B] and the lower guide plate [C] (1 clip).
4. Remove the inner cover [D] (2 screws).
5. Remove two clips [E].
6. Move the bushings [F] inward and remove the duplex feed roller assembly [G].
7. Remove the bushing [F], the paper flattener [H] (1 E-ring), the stack roller [I], the paper flattener [J], and the duplex feed roller [K].

NOTE: When installing the stack roller and the duplex feed roller, make sure that they are inserted in the correct orientation as shown.

9.3 DUPLEX FEED MOTOR REPLACEMENT



1. Remove the duplex unit (4 screws).
2. Remove the link bracket [A] (1 screw, 1 clip).
3. Remove the upper guide plate [B] and the lower guide plate [C] (1 clip).
4. Remove the inner cover [D] (1 screw).
5. Remove the inner cover bracket [E] (1 screw).
6. Remove the duplex feed roller assembly [F] (2 clips).
7. Remove the timing belt pulley [G] and remove the timing belt [H].
8. Remove the spring [I].



9. Disconnect the motor harness [A].
10. Move the jogger fence inward and remove the paper feed assembly [B] (5 screws).
11. Remove the duplex feed motor assembly [C] (3 screws).
12. Replace the duplex feed motor [D] (2 screws).

NOTE: 1) When installing the paper feed assembly, make sure that the bottom plate [E] is on top of the bracket [F] as shown.

2) When installing the paper feed assembly, make sure that the mylar [G] on the bottom plate is on top of the guide plate [H] as shown.

10. COPY QUALITY ADJUSTMENT

10.1 LIGHT INTENSITY ADJUSTMENT (SP4-001)

When:	When replacing the drum - After performing SP3-123 (Drum initialization) and before exiting SP mode.
Purpose:	To maintain the correct light intensity.
Adjustment standard:	Level 2 of the gray scale on the OS-A3 test chart should be just visible on the copy when the 4th manual image density level is selected.
How:	SP4-001 changes the exposure lamp voltage from the ac drive circuit on the dc power supply board.

NOTE: When replacing the drum, light intensity adjustment should be done only after performing SP3-123.

If the light intensity is adjusted, ADS gain data and V_L correction data are cleared. Therefore, after the light intensity adjustment, auto ADS gain adjustment (SP4-201) and forced V_L detection (SP3-105) must be performed.

See "Practical SP Mode Use Tables" in section 4 for the exact order in which SP modes must be done after changing major components.

1. Turn the main switch off.
2. Clean the following parts:

Item No.	Section	Method
(1)	Optics (mirrors, lens, reflectors, and exposure glass)	Damp cotton, and blower brush
(2)	Drum charge roller	Dry cloth or special cloth (P/N A1539004)
(3)	Toner shield glass and green filter, and erase lamp unit	Dry cloth and blower brush

3. Place an OS-A3 chart on the exposure glass.
4. Make a full size copy at manual image density level 4 (center) after the copier has warmed up.
5. Check that level 2 of the gray scale is just visible on the copy.

6. If the image density is not correct, go through the following steps.
   1) Enter SP4-001.
   2) Change the exposure lamp voltage setting displayed in the reduce/enlarge indicator. Use the number keys and follow these rules:
      If image density is too dark, increase the setting
      If image density is too light, decrease the setting

   NOTE: The voltage can be set between 50 and 75 V in 0.5 V steps. The default setting is on the "SP MODE FACTORY SETTING DATA" sheet located in the upper inner cover.

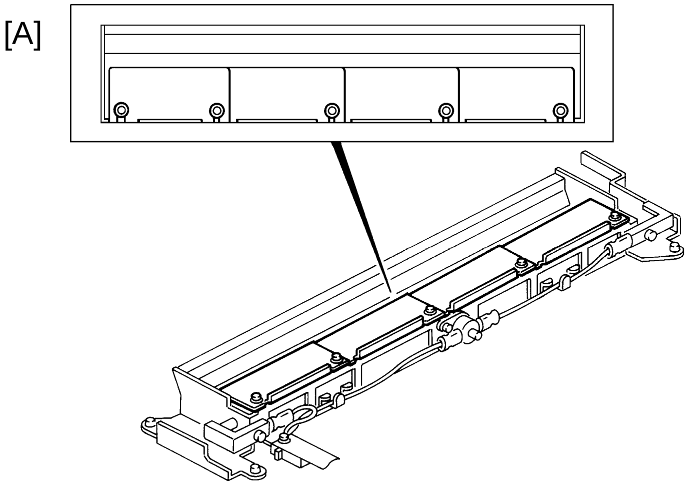
   3) Leave SP mode and make a copy at manual image density level 4.
   4) Check whether the image density is correct or not. If it is not, repeat the above steps from (1) to (3).

7. Perform ADS gain adjustment (SP4-201) and forced V_L detection (SP3-105).

NOTE: If the image density cannot be adjusted satisfactorily, adjust the development bias using SP2-201-001 (see section 10-3).

10.2 UNEVEN EXPOSURE ADJUSTMENT

When:	If the exposure is uneven.
Purpose:	To maintain even exposure.
Adjustment standard:	The side-to-side variation of the gray scales on the test chart should be less than one level.
How:	Change the position of the exposure adjusting plates to make the light intensity from the exposure lamp even across its length.



! CAUTION

Unplug the copier before starting the following procedure.

1. Clean the optics components.
2. Place a test chart on the exposure glass and make an A3/11" x 17" copy.
3. If the side-to-side variation of the gray scales is not within the adjustment standard, turn off the main switch and remove the exposure glass (see Exposure Glass Removal).
4. Position the adjusting plates [A] so that the copy quality meets the adjustment standard.

10.3 IMAGE AREA BIAS VOLTAGE ADJUSTMENT

10.3.1 Development Bias Adjustment (SP2-201-001)

When:	If the image density at manual density level 4 cannot be adjusted to specification with the exposure lamp voltage (SP4-001) after performing SP3-123 (drum initialization) when the drum is replaced.
Purpose:	To adjust the copy image density.
How:	SP2-201-001 changes the development bias voltage used for copying.

NOTE: Normally the SP2-201-001 setting should be "5" (standard).

Development bias adjustment should be done only when adjusting light intensity (SP4-001) after performing the drum initialization (SP3-123), if necessary.

SP-2-201-001 Development Bias Adjustment

Setting	Density	Development Bias Correction Voltage
1	Dark ↑	+80V
2		+60V
3		+40V
4		+20V
5	Normal	± 0V
6	↓ Light	–20V
7		–40V
8		–60V
9		–80V

1. Enter SP2-201-001.
2. Change the setting displayed in the reduce/enlarge indicator with the numeric keys.
3. Leave this SP mode.

10.3.2 Highest ID Level Bias (Manual ID Level 7) Adjustment (SP2-201-002)

When:	If a customer requests a lighter or darker copy image density at manual image density level 7.
Purpose:	To meet any customer’s requests about the image density at manual ID level 7.
How:	SP2-201-002 changes the development bias voltage for images at manual ID level 7.

SP2-201-002: Highlight Bias

Setting	Density	Development Bias Correction Voltage
1	Normal	–40V
2	Dark	± 0V
3	Lighter	–80V
4	Lightest	–120V

1. Enter SP2-201-002.
2. Change the setting displayed in the reduce/enlarge indicator with the number keys. Determine the new setting from the above table.
3. Leave SP2-201-002.

10.4 TONER DENSITY ADJUSTMENT (SP2-203)

When:	If a customer wants to change the overall image density.
Purpose:	To change the proportion of toner by weight in the developer.
How:	SP2-203 changes the development bias used for making the VSP pattern.

SP2-203: VSP Pattern Bias

Setting	Black Toner Density	Image Density	Development Bias Voltage for the ID Sensor Pattern
1	Low	Light	+100V
2	↑	↑	+80V
3			+60V
4			+40V
5			+20V
6	Normal	Normal	± 0
7	↓	↓	–20V
8			–40V
9			–60V
10	High	Dark	–80V

1. Enter SP2-203.
2. Change the setting displayed in the reduce/enlarge indicator with the numeric keys. Determine the new setting from the above table.
3. Leave this SP mode.

10.5 DETECT/FIXED/TD SENSOR TONER SUPPLY MODE SELECTION (SP2-208-001)

When:	If the ID sensor or the TD sensor is in an abnormal condition.
Purpose:	To leave the detect supply mode and to enter TD sensor supply mode or fixed supply mode.
How:	SP2-208-001 changes the toner supply mode.

NOTE: If the ID sensor is in an abnormal condition, enter the TD sensor supply mode.
If the TD sensor is in an abnormal condition, enter the fixed supply mode.

SP2-208-001: Toner Supply Mode Selection
1: TD sensor supply mode
2: Fixed supply mode
3: Detect supply mode

10.6 AUTOMATIC ID SENSOR ADJUSTMENT (SP3-001)

When:	1. After cleaning, removing, or replacing the ID sensor board. 2. After replacing the OPC drum or RAM board on the main control board. 3. If a toner supply control problem occurs. 4. If memory all clear (SP5-801) has been performed.
Purpose:	To make sure that the ID sensor functions correctly.
Adjustment standard:	ID sensor: $V_{SG} = 4.0 \pm 0.2$ V
How:	SP3-001 adjusts the value in memory for the ID sensor LED to get the correct sensor output.

NOTE: The adjusted value and sensor output can be monitored with SP3-002. Refer to the SP mode table for details.

10.7 TONER SUPPLY RATIO SELECTION

When:	If the standard setting for the toner supply amount is not appropriate for the type of original in use.
Purpose:	To adjust the toner supply amount. The value of the toner supply ratio should match the proportion of black on typical originals used by the customer.
How:	Detect supply mode: SP2-222 TD sensor supply mode: SP2-208-002 Fixed supply mode: SP2-208-003 All three service programs change the toner supply clutch ON period.

SP2-222: Toner Supply Ratio (Detect Supply Mode)

Setting	1	2	3	4
Toner Supply Ratio	7%	15%	30%	60%

SP2-208-002: Toner Supply Ratio (TD Sensor Supply Mode)

Setting	1	2	3	4
Toner Supply Ratio	7%	15%	30%	60%

SP2-208-003: Toner Supply Ratio (Fixed Supply Mode)

Setting	1	2	3	4
Toner Supply Ratio	2%	4%	6%	11%

10.8 ADS SENSOR AUTOMATIC ADJUSTMENT (SP4-201)

When:	1. If the ADS sensor output voltage is not within the adjustment standard after cleaning the optics. 2. After replacing the following parts: ADS board, Exposure lamp, RAM board on the main control board. 3. If memory all clear (SP5-801) has been performed.
Purpose:	To make sure that the ADS sensor functions correctly.
Adjustment standard:	ADS Voltage = 2.7 ± 0.1V
How:	SP4-201 adjusts the ADS gain value in memory to get the correct sensor output.

NOTE: Close the platen cover to prevent external light from reaching the ADS sensor when performing this adjustment.
The adjusted ADS gain value and the sensor output can be monitored with SP4-202. Refer to the SP mode table for details.

10.9 ADS DENSITY SELECTION (SP5-106)

When:	If copies are too light or dirty background appears on copies in ADS mode.
Purpose:	To maintain good copy quality in ADS mode.
How:	Use SP5-106. For example, for lighter copies, select the "2: Light" setting (this increases the negative development bias voltage).

SP5-106: ADS Density
0: Dark
1: Normal
2: Light

10.10 VERTICAL MAGNIFICATION ADJUSTMENT (SP4-008)

When:	If vertical magnification is not within the adjustment standard.
Purpose:	To maintain proper vertical magnification.
Adjustment standard:	Less than ±1.0% difference between original and copy.
How:	SP4-008 changes the scanner speed compensation.

1. Place a 150 mm scale on the exposure glass perpendicular to the left scale.
2. Make a full size copy.
3. Check whether vertical magnification is within the adjustment standard.
4. If vertical magnification is not correct, go through the following steps.
   1) Enter SP4-008.
   2) Change the vertical magnification setting displayed in the reduce/enlarge indicator. Use the number keys and follow these rules:
      If the copy image is too short, increase the setting
      If the copy image is too long, decrease the setting

   NOTE: SP4-008 can be set between 0 and 32. Vertical magnification changes 0.1% per step.

   3) Leave the SP mode.
   4) Check whether vertical magnification is correct or not. If it is not, repeat the above steps from (1) to (3).

10.11 HORIZONTAL MAGNIFICATION ADJUSTMENT (SP4-101)

When:	If horizontal magnification is not within the adjustment standard.
Purpose:	To maintain proper horizontal magnification.
Adjustment standard:	Less than ±0.5% difference in full size mode between original and copy.
How:	SP4-101 changes the lens home position.

1. Place a 150 mm scale parallel to the left scale on the exposure glass.
2. Make a full size copy.
3. Check whether horizontal magnification is within the adjustment standard.
4. If horizontal magnification is not correct, go through the following steps:
    1) Enter SP4-101.
    2) Change the horizontal magnification setting displayed in the three-digit indicator. Use the number keys and follow these rules:
    If the copy image is too short, increase the setting
    If the copy image is too long, decrease the setting

    NOTE: SP4-101 can be set between 0 and 32. Horizontal magnification changes 0.1% per step.

    3) Leave SP mode.
    4) Check whether horizontal magnification is correct or not. If it is not, repeat the above steps from (1) to (3).

10.12 FOCUS ADJUSTMENT IN FULL SIZE MODE (SP4-103)

When:	If the copy in full size mode is out of focus.
Purpose:	To maintain correct focus in full size mode.
How:	SP4-103 changes the 3rd scanner home position.

NOTE: Adjust the focus by checking the copies.
Check the horizontal magnification after doing SP4-103, and adjust it if necessary.

SP4-103: Focus Adjustment
0 - 150 (default = 75), 0.05 mm per step

10.13 FOCUS ADJUSTMENT IN ENLARGE/REDUCE MODE (SP4-102)

When:	If the copy is out of focus in enlarge/reduce mode after adjusting SP4-008 (vertical magnification), SP4-101 (horizontal magnification), and SP4-103 (focus adjustment in full size).
Purpose:	To maintain correct focus in enlarge/reduce mode.
How:	SP4-102 changes the lens position 0.1% per step in enlarge/reduce mode.

NOTE: Normally, the factory-set value is best for this adjustment. Refer to "SP MODE FACTORY SETTING DATA" sheet located in the upper inner cover.

SP4-102: Lens Error Correction
0 - 16 (default = 8, – 0.8% to + 0.8%)

10.14 LEAD EDGE REGISTRATION ADJUSTMENT (SP1-001)

When:	If lead edge registration is not within the adjustment standard.
Purpose:	To maintain proper lead edge registration.
Adjustment standard:	0 ± 2 mm (0 ± 0.08")
How:	SP1-101 changes the registration roller start timing.

SP1-101: Registration
0 - 32 (default = 16, – 8.0 mm to + 8.0 mm), 0.5 mm per step

10.15 LEAD EDGE ERASE MARGIN ADJUSTMENT (SP2-101-001)

When:	If the lead edge erase margin is not within the adjustment standard.
Purpose:	To maintain a proper lead edge erase margin.
Adjustment Standard:	2.5 ± 1.5 mm (0.1 ± 0.06")
How:	SP2-101-001 changes the erase lamp off timing.

SP2-101-001: **Lead Edge Erase**
0 - 32 (default = 16, – 8.0 mm to + 8.0 mm), 0.5 mm per step

10.16 SIDE-TO-SIDE REGISTRATION ADJUSTMENT (SP4-011-001~009)

When:	If side-to-side registration is not within the adjustment standard.
Purpose:	To maintain proper side-to-side registration from all feed stations.
Adjustment standard:	0 ± 2 mm (0 ± 0.08")
How:	SP4-011-001~009 changes the lens horizontal home position. SP4-011-001~007 and 009 change the lens horizontal home position used for certain units (see step 3 below). If registration is not within the standard when using a certain unit, use one of these SP modes. SP4-011-008 is the base adjustment made in the factory. If this setting is changed by a small amount, all other SP4-011 settings change automatically by the same amount. Use this if the image shift direction (to the front or to the rear) is the same from all paper feed stations.

1. Make a full size copy from each paper feed station.
2. Check whether side-to-side registration is within the adjustment standard.

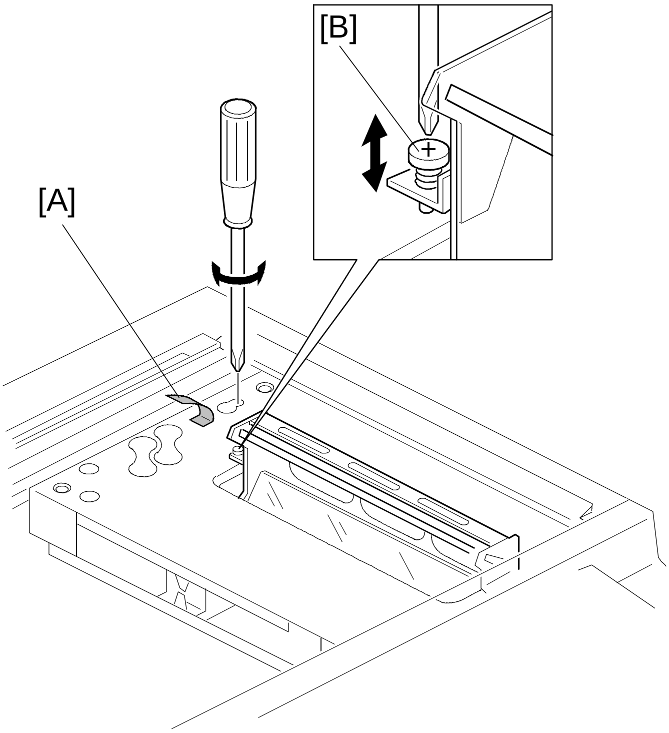
3. If side-to side registration is not correct, go through the following steps:
   1) Enter SP4-011.
   2) Select the required 3rd level program number from the table below with the [+] and [−] keys.

3rd Level Program Number	Non-duplex Machines	Duplex Machines
–001	1st Tray	Duplex
–002	2nd Tray	1st Tray
–003	3rd Tray	2nd Tray
–004	4th Tray	3rd Tray
–005	5th Tray	4th Tray
–006	By-pass	By-pass
–007	LCT	LCT
–008	Base setting made in the factory	
–009	ADF	ADF

   3) Change the side-to-side registration setting displayed in the reduce/enlarge indicator. Use the number keys and follow these rules:
      If the copy image is shifted to front, increase the setting
      If the copy image is shifted to rear, decrease the setting
   4) Leave SP mode.
   5) Check whether side-to-side registration is correct or not. If it is not, repeat the above steps from (1) to (4).

10.17 4TH/5TH MIRROR HEIGHT ADJUSTMENT

When:	If skewed images appear.
Purpose:	To maintain proper copy quality.
How:	Turn the 4th/5th mirror height adjustment screw. This changes the 4th/5th mirror height.



! CAUTION

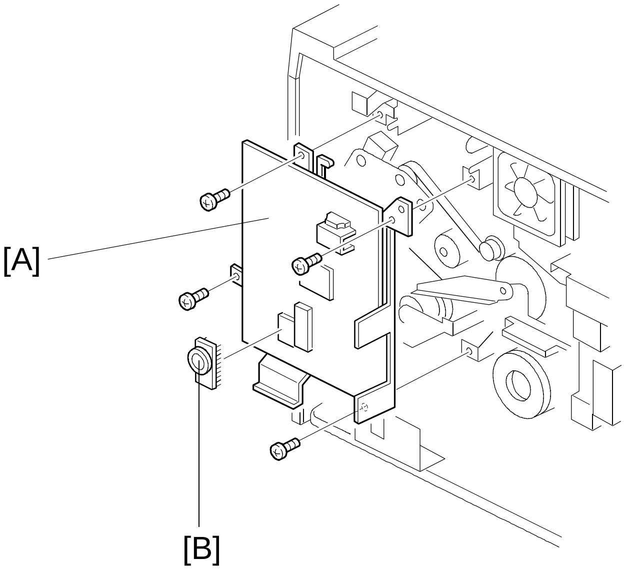
Never perform this adjustment unless you have positively verified that the source of the image skewing is optical and not in the paper path.

1. Turn off the main switch and remove the exposure glass.
2. Peel off the shielding mylar [A] halfway.
3. Adjust the 4th/5th mirror height by turning the adjusting screw [B].

NOTE: After the adjustment, stick the mylar [A] again in its former position.

11. OTHERS

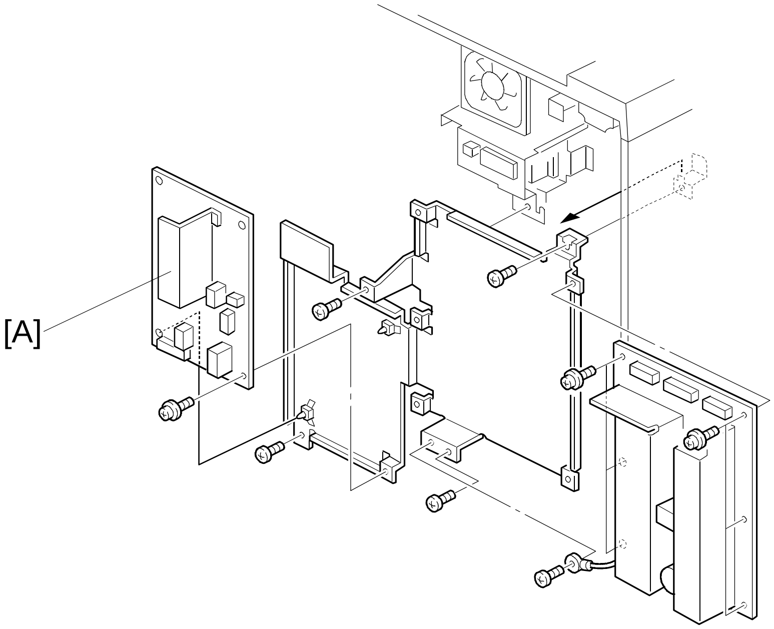
11.1 MAIN CONTROL BOARD REPLACEMENT



NOTE: Never touch the surface of the RAM back up battery on the main board with a screwdriver or other metallic object. If the battery is short-circuited, RAM data will be destroyed in the worst case.

1. Turn off the main switch and unplug the power cord.
2. Remove the rear cover.
3. Remove the main control board [A] (4 screws and all connectors).
4. Remove the RAM board [B] from the old main control board and install it on the new board.

11.2 AC POWER SUPPLY BOARD REPLACEMENT

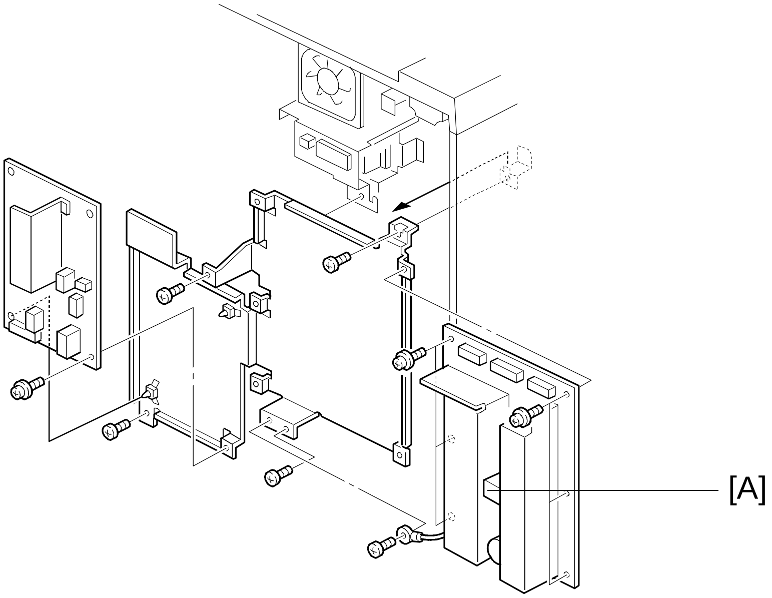


NOTE: 1. For 115V machines, check the fuse on the board before determining that the ac drive board is defective.

2. Do not adjust VR371 on the ac drive board. Copy quality will be seriously affected if it is turned.

1. Turn off the main switch and unplug the machine.
2. Remove the rear cover.
3. Replace the ac drive board [A] (1 screw, 3 locking supports, and all connectors).

11.3 DC POWER SUPPLY BOARD REPLACEMENT

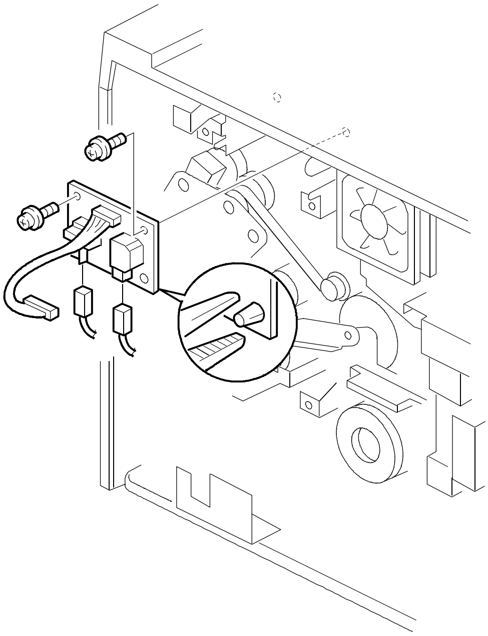


NOTE: Check the fuses (FU301, FU302, FU303, and FU304) on the board before determining that the dc power supply board is defective.

1. Turn off the main switch and unplug the machine.
2. Remove the rear cover.
3. Replace the dc power supply board [A] (7 screws and all connectors).

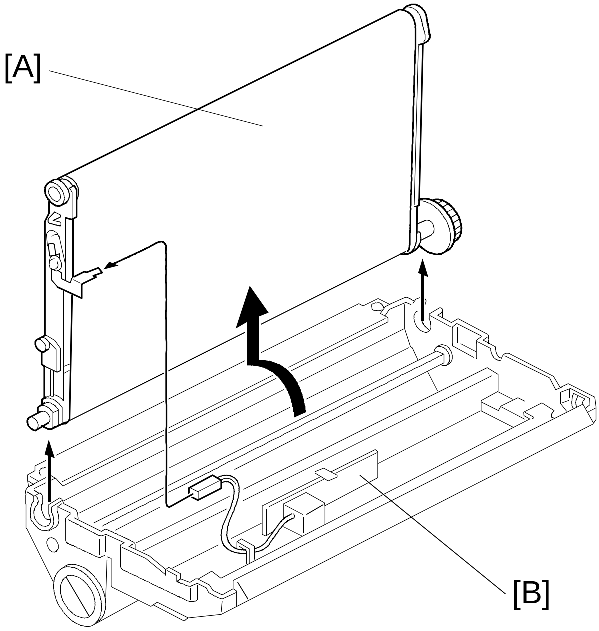
   NOTE: 6 screws for 115V machines.

11.4 CB HIGH VOLTAGE SUPPLY BOARD REPLACEMENT



1. Turn off the main switch and unplug the machine.
2. Remove the rear cover.
3. Remove the main control board.
4. Replace the CB high voltage supply board [A] (2 screws and 1 locking support).

11.5 T HIGH VOLTAGE SUPPLY BOARD REPLACEMENT



1. Turn off the main switch and unplug the machine.
2. Remove the transfer belt unit [A]. (See "Transfer Belt Unit Removal".)
3. Replace the T high voltage supply board [B] (1 screw, 1 clamp, and 2 metal spring plates).

SECTION 6

TROUBLESHOOTING

1. COPY QUALITY

1.1 INTRODUCTION

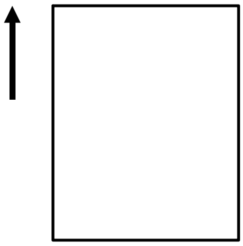
This troubleshooting guide is compiled to help field engineers solve some of the more common field problems. However, it does not cover all the potential problems. We request your help in improving our troubleshooting documentation. Whenever you encounter new field problems, please submit detailed reports to the nearest service support office. We will then issue additional troubleshooting information based on reports from you and other field service engineers around the world.

1. The following is a comparison table showing the area you should check first if you have image problems at periodic intervals.

Interval of Periodic Image Problem	Possible Cause
188.4 mm/7.42"	Drum
43.9 mm/1.73"	Drum Charge Roller
334 mm/13.15" (A153, A155, and A156 copiers) 244.5 mm/9.63" (A157, A159, and A160 copiers)	Transfer Belt
125.6 mm/4.94"	Hot Roller or Pressure Roller

2. If the problem is related to electrical circuit boards, first disconnect, then reconnect the connectors before replacing the PCBs.

1.2 BLANK COPY (WHITE COPY)



- Problem -

White or almost white copy.

- Possible Causes -

1. Charge is not applied.
   - CB high voltage supply board failure
   - Poor high voltage terminal contact
   - Broken drum charge roller
   - Broken transfer belt contact clutch

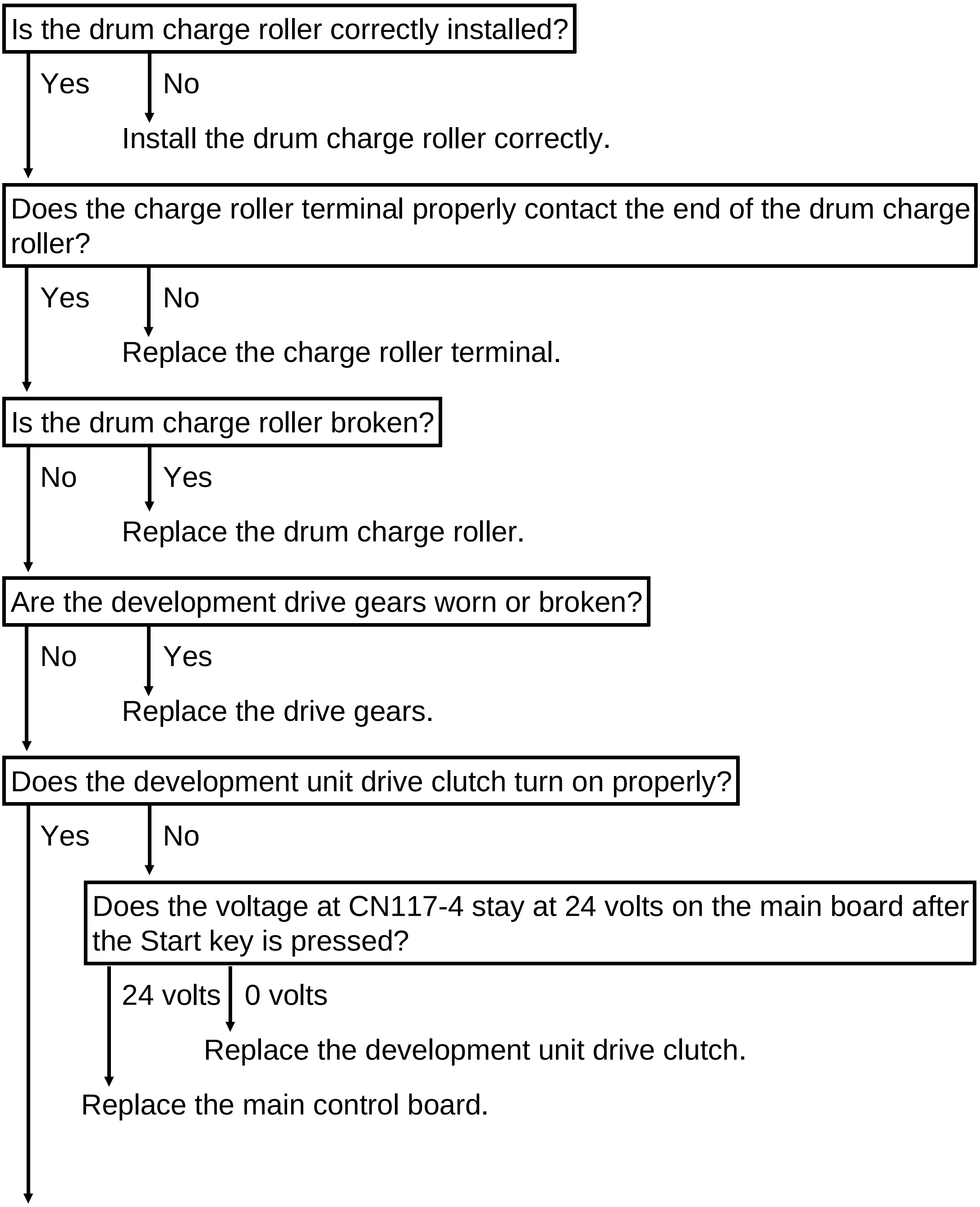
2. The copy image is not transferred to the paper.
   - T high voltage supply board failure
   - Poor high voltage lead wire contact
   - Damaged transfer belt

3. The development roller does not rotate.
   - Broken drive gears
   - Defective development unit drive clutch
   - Broken transfer belt contact clutch.

4. Poor drum sensitivity.
   - The drum was exposed to fluorescent light or direct sunlight for long period of time
   - The drum was exposed to ammonia gas or corrosive fumes for a long period of time

5. The drum does not rotate.

- Action -



Is the drum charge roller correctly installed?

Yes / No

Install the drum charge roller correctly.

Does the charge roller terminal properly contact the end of the drum charge roller?

Yes / No

Replace the charge roller terminal.

Is the drum charge roller broken?

No / Yes

Replace the drum charge roller.

Are the development drive gears worn or broken?

No / Yes

Replace the drive gears.

Does the development unit drive clutch turn on properly?

Yes / No

Does the voltage at CN117-4 stay at 24 volts on the main board after the Start key is pressed?

24 volts / 0 volts

Replace the development unit drive clutch.

Replace the main control board.

Yes

Does the drum rotate properly?

Yes

No

Check drum drive mechanisms such as the drum drive belt and the drum pulleys.

Check the following points:

- CN115-3 (Charge PWM)
  (1) If the signal stays LOW after the Start key is pressed, replace the main control board.

  (2) If no drum charge voltage is applied to the drum charge roller even if the signal changes to a 5V pulse signal, replace the CB high voltage supply board.

- CN105-2 (Transfer PWM)
  (1) If the signal stays LOW after the Start key is pressed, replace the main control board.

  (2) If no transfer voltage is applied to the transfer belt unit even if the signal changes to a 5V pulse signal, replace the T high voltage supply board.

If there is no problem with the signal lines, replace the drum if the sensitivity does not recover even when the drum is not exposed to light.

1.3 DIRTY BACKGROUND

- Problem -

1. Dirty background at image density level 4 (manual setting).

2. Copies made in ADS mode have a dirty background.

- Possible Causes -

1. V_L correction failure
   - Very dirty optics (V_L correction cannot compensate)
   - Deteriorated exposure lamp (maximum output cannot give sufficient light intensity)
   - Failure of the dc power supply board
   - Dirty erase lamp unit

2. V_R correction failure
   - CB (development bias) high voltage supply board failure
   - Poor development bias terminal contact
   - The development bias is grounded

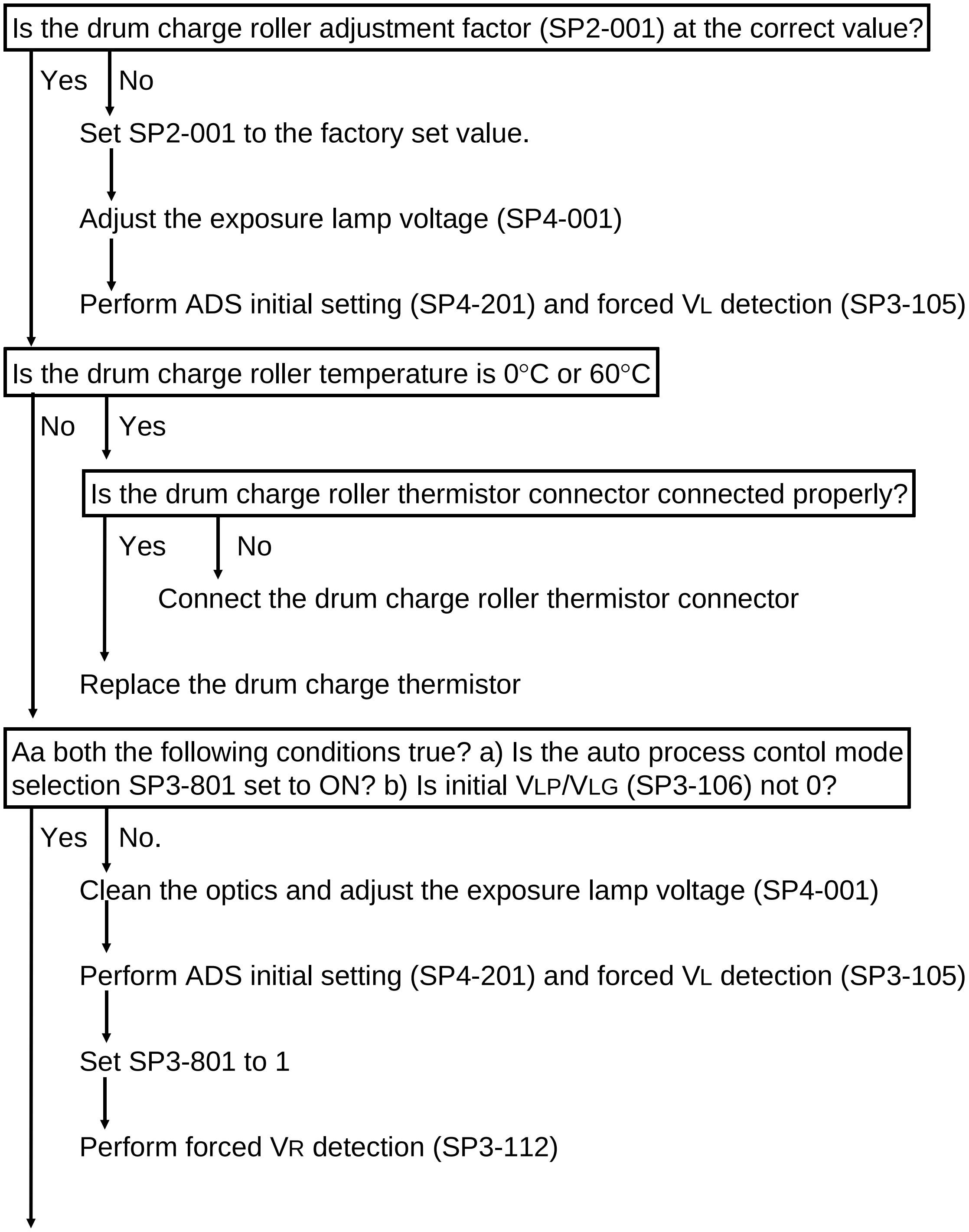
3. The OPC drum is not grounded properly

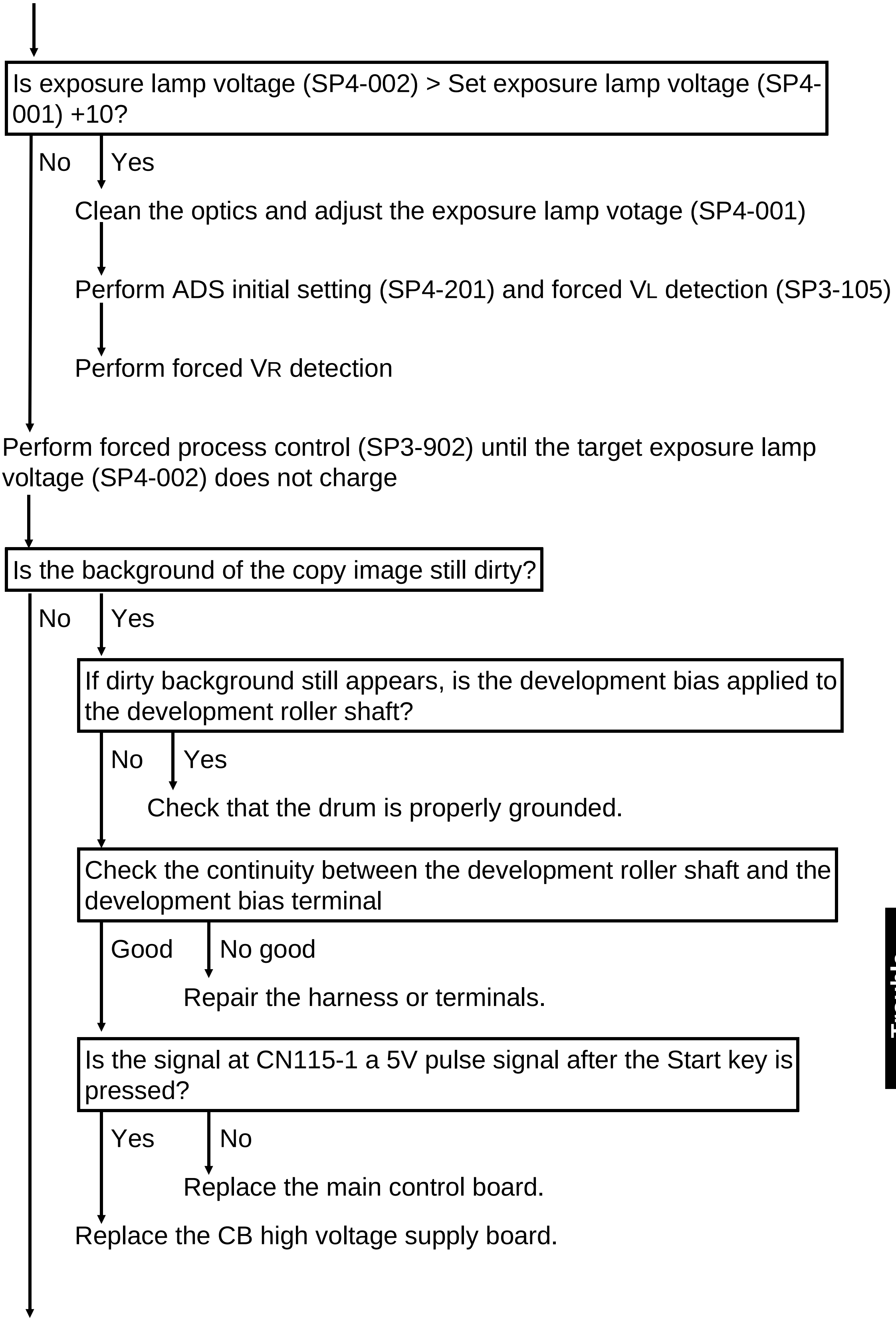
4. ADS mode
   - Improper ADS Density setting (SP5-106)
   - ADS Sensor board failure
   - CB high voltage supply board failure
   - Incorrect adjustment of the ADS sensor (SP4-201)
   - Sensitivity of the ADS sensor is not correct for the original

5. High toner density
   - Improper setting of the drum charge voltage adjustment (SP2-001)
   - Improper V_{SP} pattern bias (SP2-203)
   - Dirty erase lamp unit

6. Drum charge roller thermister error
   - Connector of the drum charge roller thermistor id not connected properly.
   - Broken drum charge roller thermistor

- Action -


Is the drum charge roller adjustment factor (SP2-001) at the correct value?
Yes
No
Set SP2-001 to the factory set value.
Adjust the exposure lamp voltage (SP4-001)
Perform ADS initial setting (SP4-201) and forced VL detection (SP3-105)
Is the drum charge roller temperature is 0°C or 60°C
No
Yes
Is the drum charge roller thermistor connector connected properly?
Yes
No
Connect the drum charge roller thermistor connector
Replace the drum charge thermistor
Aa both the following conditions true? a) Is the auto process contol mode selection SP3-801 set to ON? b) Is initial VLP/VLG (SP3-106) not 0?
Yes
No.
Clean the optics and adjust the exposure lamp voltage (SP4-001)
Perform ADS initial setting (SP4-201) and forced VL detection (SP3-105)
Set SP3-801 to 1
Perform forced VR detection (SP3-112)



Is exposure lamp voltage (SP4-002) > Set exposure lamp voltage (SP4-001) +10?

No

Yes

Clean the optics and adjust the exposure lamp votage (SP4-001)

Perform ADS initial setting (SP4-201) and forced V_L detection (SP3-105)

Perform forced V_R detection

Perform forced process control (SP3-902) until the target exposure lamp voltage (SP4-002) does not charge

Is the background of the copy image still dirty?

No

Yes

If dirty background still appears, is the development bias applied to the development roller shaft?

No

Yes

Check that the drum is properly grounded.

Check the continuity between the development roller shaft and the development bias terminal

Good

No good

Repair the harness or terminals.

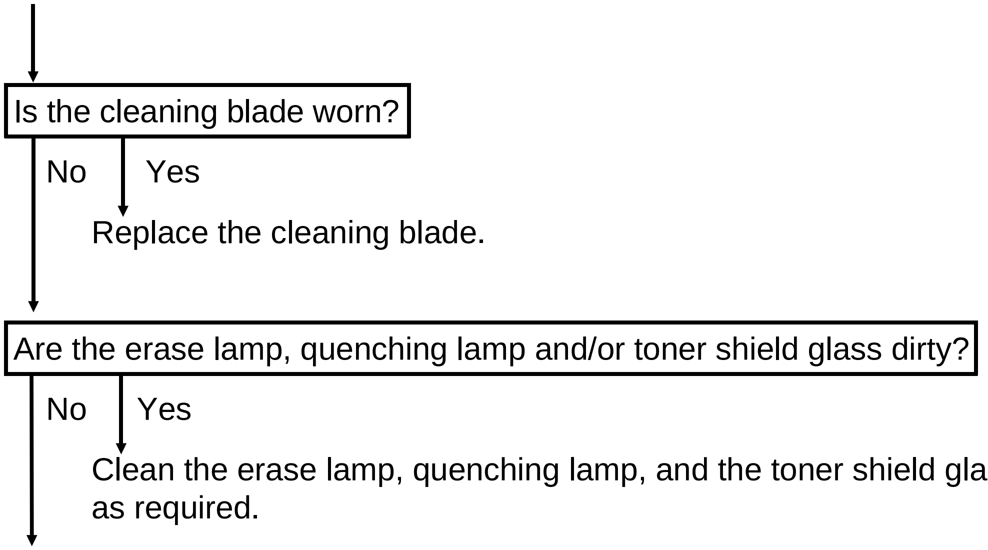
Is the signal at CN115-1 a 5V pulse signal after the Start key is pressed?

Yes

No

Replace the main control board.

Replace the CB high voltage supply board.



Is the cleaning blade worn?

No Yes

Replace the cleaning blade.

Are the erase lamp, quenching lamp and/or toner shield glass dirty?

No Yes

Clean the erase lamp, quenching lamp, and the toner shield glass, as required.

If toner scattering occurs, see "1.13 Toner Scattering" later in this section.

If dirty background occurs only in ADS mode, do the following:

- If the ADS voltage (SP4-202) is not within 2.7 ± 0.1 volts (this is the standard voltage), readjust the ADS voltage (SP4-201).
- Change the ADS density setting (SP5-106) from 1 (Normal) to 2 (Light).

If dirty background occurs only for some types of red paper originals in ADS mode, do the following:

- Change the ADS sensor to the optional ADS sensor which has different sensitivity for red paper originals. See "ADS SENSOR (OPTION)" in Section 3.

1.4 UNEVEN IMAGE DENSITY

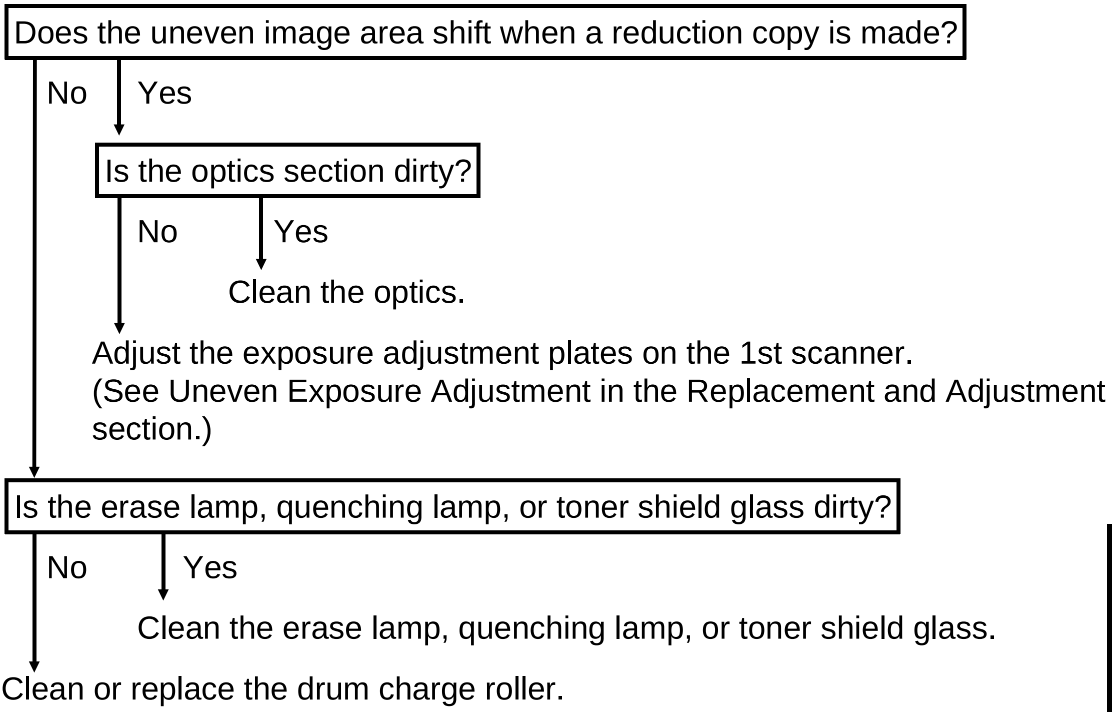
- Problem -

Uneven image density appears on copies.

- Possible Cause -

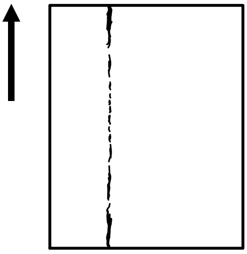
1. Dirty optics
2. The exposure adjustment plates are out of positon
3. Dirty drum charge roller
4. Improper function of cross mixing in the development unit

- Action -


Does the uneven image area shift when a reduction copy is made?
No
Yes
Is the optics section dirty?
No
Yes
Clean the optics.
Adjust the exposure adjustment plates on the 1st scanner.
(See Uneven Exposure Adjustment in the Replacement and Adjustment section.)
Is the erase lamp, quenching lamp, or toner shield glass dirty?
No
Yes
Clean the erase lamp, quenching lamp, or toner shield glass.
Clean or replace the drum charge roller.

1.5 VERTICAL BLACK BANDS

- Problem -



Vertical black bands appear on the copy.

- Possible Causes -

1. Dirty optics
2. Dust between the cleaning blade and the drum
3. The edge of the cleaning blade is deformed
4. Dirty drum charge roller.
5. Deformed inlet seal on the development unit

- Action -

Do the black bands shift when a reduction copy is made?

No ↓ / Yes ↓

Yes: Check and clean the optics section (including the toner shield glass).

No:

Press the blade release lever several times to clean the edge of the cleaning blade. If black bands still appear, go to the next step.

↓

Is the edge of the cleaning blade deformed?

No ↓ / Yes ↓

Yes: Replace the cleaning blade.

No:

Is the drum charge roller dirty ?

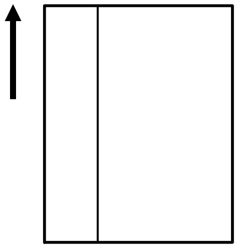
No ↓ / Yes ↓

Yes: Clean or replace the drum charge roller.

No:

If the inlet seal on the development unit is deformed, replace the inlet seal plate and the seal as a set.

1.6 VERTICAL BLACK LINES



- Problem -

Thin black lines appear on the copy.

- Possible Causes -

1. Scratched cleaning blade
2. Dirty or scratched mirrors
3. Scratched or dirty drum
4. Scratched hot roller

- Action -

Do the black lines shift when a reduction copy is made?

No ↓ Yes ↓

Clean or replace the exposure glass or mirrors.

Is the toner shield glass or green filter scratched?

No ↓ Yes ↓

Replace the toner shield glass or green filter.

Is the edge of the cleaning blade scratched?

No ↓ Yes ↓

Replace the cleaning blade.

Is the hot roller scratched?

No ↓ Yes ↓

Check whether black lines appear on the copy by stopping the copy paper in the transport section. If no black lines appear, replace the hot roller.

Check whether the drum is scratched or there is built-up toner on the drum.

- If toner is built up on the drum, clean the drum as follows;

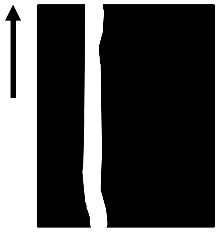
  Wipe with a dry cloth → Wipe with a cloth wet with water → Wipe again with a dry cloth (until no water remains)

  NOTE: Never use alcohol to clean the drum, alcohol dissolves the drum surface.

- If the drum is scratched, replace the drum.

1.7 VERTICAL WHITE LINES OR BANDS—1 (DULL OR BLURRED)

- Problem -



Dull or blurred white lines appear on the copy.

- Possible Causes -

1. Dirty or deteriorated drum charge roller
2. Damp or deformed inlet seal on the development unit

- Action -

Is the drum charge roller dirty?

No ↓ Yes ↓

Clean the drum charge roller with a dry cloth.

Is the inlet seal damp or deformed.

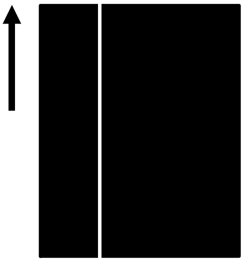
No ↓ Yes ↓

Clean the inlet seal with a dry cloth. If the problem is not corrected, replace the inlet seal plate and the seal as a set.

Replace the drum charge roller.

1.8 VERTICAL WHITE LINES OR BANDS—2 (THIN, DISTINCT)

- Problem -



Vertical white lines appear on the copy.

- Possible Causes -

1. Dirty or deteriorated drum charge roller
2. Paper dust on the edge of the cleaning blade
3. Scratched drum
4. Scratched hot roller

- Action -

Is the drum charge roller dirty?

No Yes

Clean the drum charge roller with a dry cloth.

Press the cleaning blade release lever several times. Make a copy and if white lines still appear, go to the next step.

Make a copy and stop the machine when the paper reaches the transport section. Do white lines appear on the copy?

No Yes

Replace the drum if it is scratched.

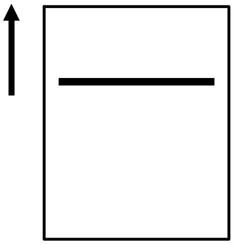
Replace the hot roller if it is scratched.

NOTE: If the drum is scratched, find out what caused the scratches on the drum and correct the problem. It could be any of the following.

- Paper misfeed
- Incorrect positioning of the pick-off pawls
- Foreign substances on the cleaning blade
- Carrier leakage

1.9 HORIZONTAL BLACK/WHITE LINES

- Problem -



Black or white lines perpendicular to the paper feed direction appear on the copy image.

- Possible Causes -

1. The drum is scratched.
   If black/white lines appear at 188.4 mm (7.42") intervals, the cause is a scratched drum or toner build-up.
2. The drum charge roller is scratched.
   If black/white lines appear at 43.9 mm (1.73") intervals, the cause is a scratched drum charge roller.
3. The hot roller is scratched.
   If black lines appear at 125.6 mm (4.94") intervals, the cause is a scratched hot roller.
4. Toner adheres to the drum surface.
   Due to insufficient cleaning, foreign matter may accumulate on the blade, causing toner to stick to the drum surface when the drum stops.

- Action -

Is the drum scratched?

No ↓ Yes ↓ Replace the drum.

Is the drum charge roller scratched ?

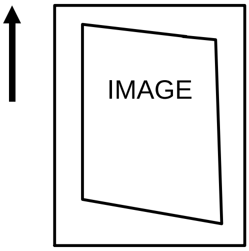
No ↓ Yes ↓ Replace the drum charge roller.

Is the hot roller scratched?

No ↓ Yes ↓ Replace the hot roller.

If toner adheres to the drum surface, clean the drum with wet cotton. Also clean or replace the cleaning blade.

1.10 SKEWED (OPTICAL) COPY IMAGE



- Problem -

The copy image is skewed (into a parallelogram shape).

The sides of the copy image are straight, but the leading and trailing edges are skewed.
(This differs from skewing originating in the paper path.)

- Possible Causes -

1. The 1st and 2nd scanners are positioned incorrectly.
2. The 3rd scanner is not parallel with the 1st and 2nd scanners.
3. The mirrors are in the wrong position.
4. The stubs of the 3rd scanner are off the rails.

- Action -

Are the 1st and 2nd scanners properly positioned ?

Yes ↓ No ↓

Reposition the scanners correctly.

Is each mirror positioned correctly on its scanner?

Yes ↓ No ↓

Reposition the mirror correctly. If the spring plates are defective, replace them.

Are the stubs of the 3rd scanner assembly off the rails?

No ↓ Yes ↓

Put the scanner assembly stubs back on the rails.

Readjust the height of the 3rd scanner by turning the adjusting screw.

1.11 TONER DENSITY TOO HIGH

- Problem -

1. Dirty background appears on the copy.
2. The image density of black solid areas is too high.

- Possible Causes -

1. The toner supply clutch keeps turning continuously.
2. The copier entered fixed toner supply mode due to an abnormal sensor condition.
3. The main control board is defective.
4. The VSP pattern development bias is too high.
5. The drum charge voltage for making VSP patterns is too low.

- Action -

Check the values of VSP and VSG with SP3-103-001 and SP3-103-002 respectively

Clean the ID sensor and around the drum including the development unit.

Adjust the ID sensor with SP3-001.

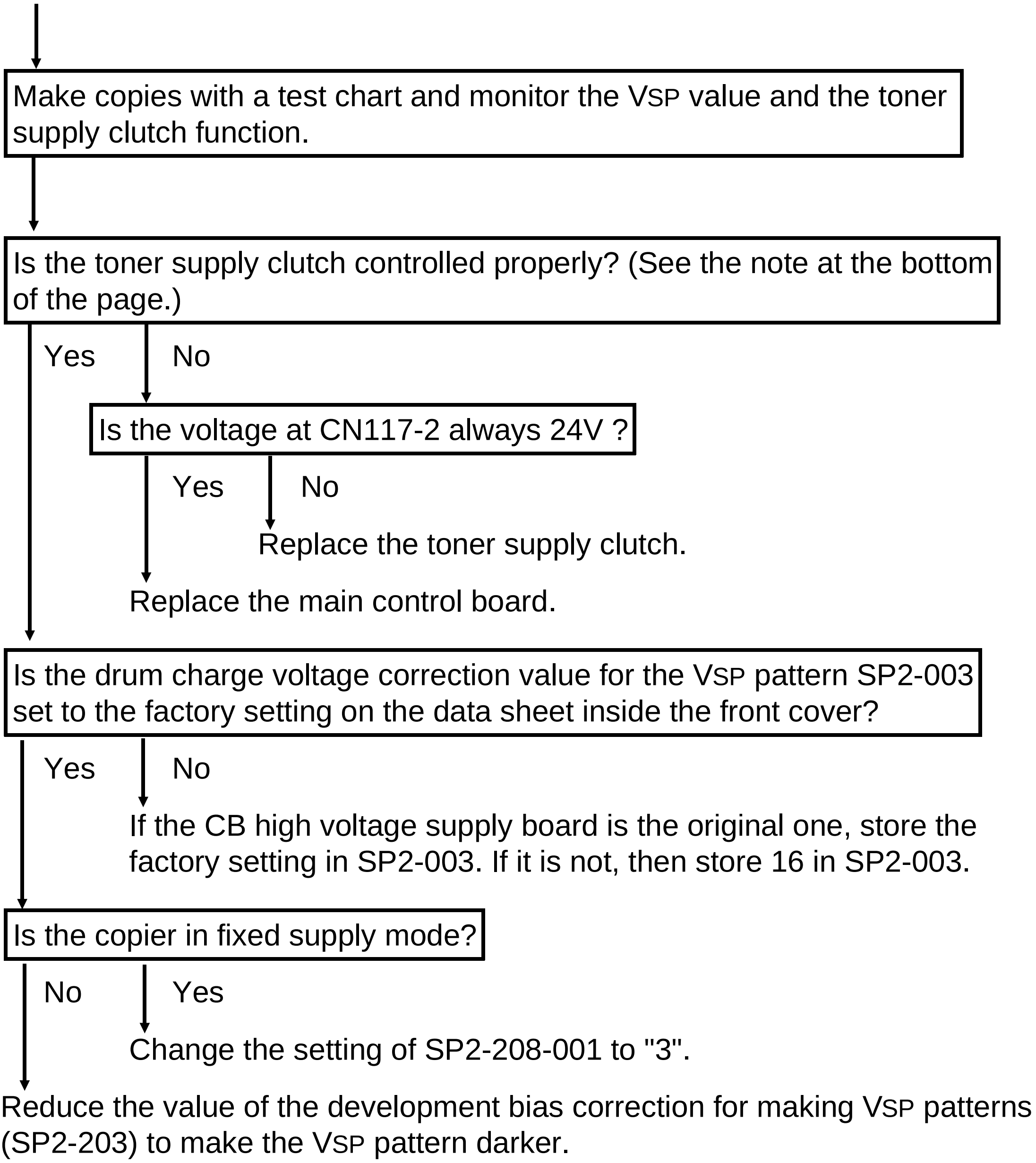
Can the ID sensor be adjusted correctly?

Yes

No

Refer to the section dealing with SC351.

Enter SP3-103-001 (displays the value of VSP) and make sky-shot copies until VSP becomes about 0.4 V.



Make copies with a test chart and monitor the VSP value and the toner supply clutch function.

Is the toner supply clutch controlled properly? (See the note at the bottom of the page.)

Is the voltage at CN117-2 always 24V ?

Replace the toner supply clutch.

Replace the main control board.

Is the drum charge voltage correction value for the VSP pattern SP2-003 set to the factory setting on the data sheet inside the front cover?

If the CB high voltage supply board is the original one, store the factory setting in SP2-003. If it is not, then store 16 in SP2-003.

Is the copier in fixed supply mode?

Change the setting of SP2-208-001 to "3".

Reduce the value of the development bias correction for making VSP patterns (SP2-203) to make the VSP pattern darker.

Note: The toner supply clutch should turn on for about a second or a second and a half at intervals that depend on the condition of the developer. The toner supply clutch should not remain on for long periods, switch on/off erratically, or stay on permanently.

1.12 TONER DENSITY TOO LOW

- Problem -

1. Light copies
2. Carrier on the copies.
3. Light spots appear in solid black areas.

- Possible Causes -

1. The toner supply clutch does not rotate.
2. The copier entered fixed toner supply mode due to an abnormal sensor condition.
3. The main control board is defective.
4. The VSP pattern bias is too low.
5. The drum charge voltage for making VSP patterns is too high.

- Action -

Check the values of VSP and VSG with SP3-103-001 and SP3-103-002 respectively.

↓

Clean the ID sensor and around the drum.

↓

Adjust the ID sensor with SP3-001.

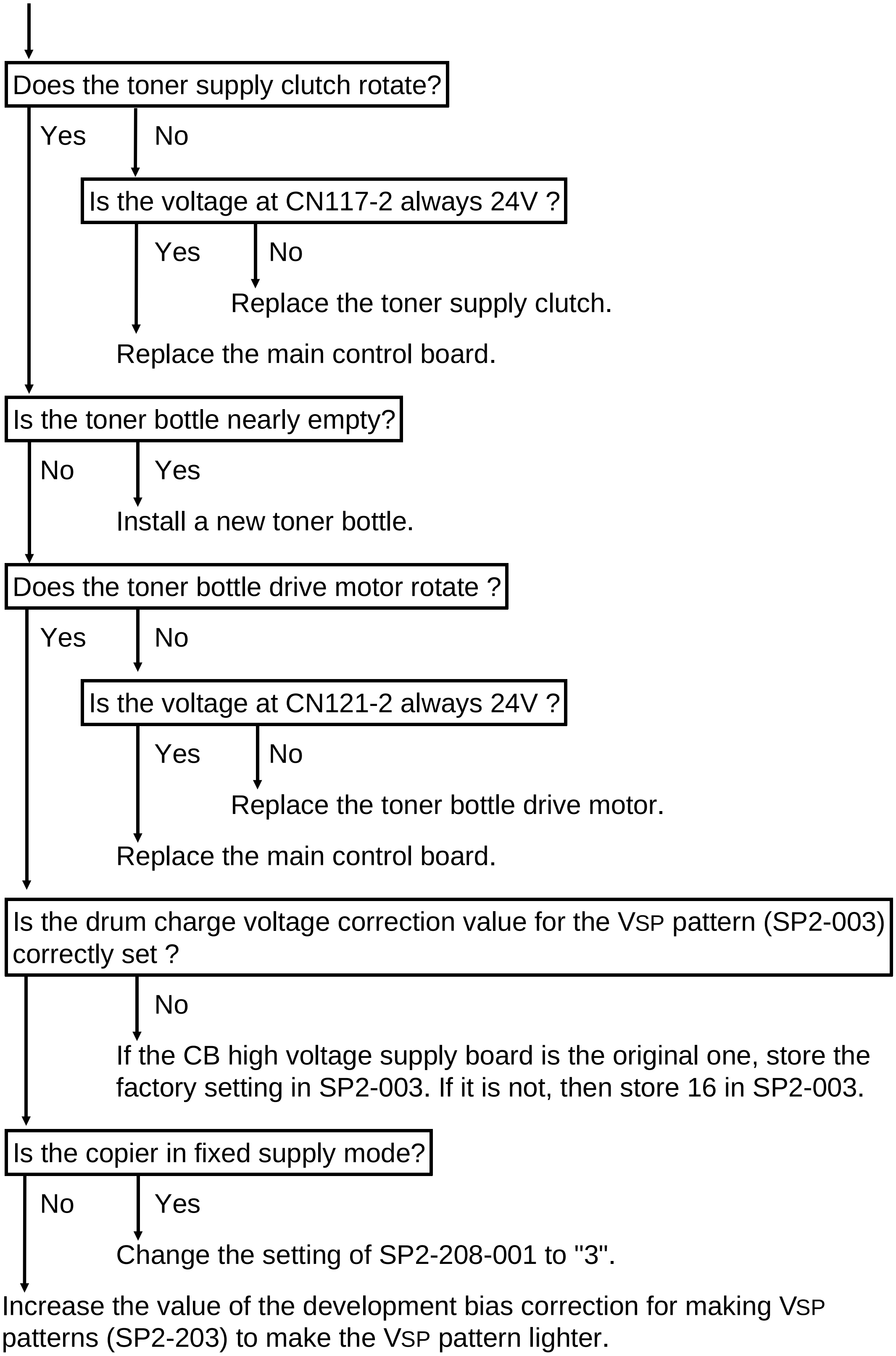
↓

Can the ID sensor be adjusted correctly?

Yes ↓ No ↓

No: Refer to the section that deals with SC351.

Yes: Perform forced toner supply (SP2-207) until VSP is at about the threshold level (around 0.4 V). Check VSP with SP3-103-001 as necessary.



Does the toner supply clutch rotate?

- Yes → Is the toner bottle nearly empty?
- No → Is the voltage at CN117-2 always 24V ?
  - Yes → Replace the main control board.
  - No → Replace the toner supply clutch.

Is the toner bottle nearly empty?

- No → Does the toner bottle drive motor rotate ?
- Yes → Install a new toner bottle.

Does the toner bottle drive motor rotate ?

- Yes → Is the drum charge voltage correction value for the VSP pattern (SP2-003) correctly set ?
- No → Is the voltage at CN121-2 always 24V ?
  - Yes → Replace the main control board.
  - No → Replace the toner bottle drive motor.

Is the drum charge voltage correction value for the VSP pattern (SP2-003) correctly set ?

- No → If the CB high voltage supply board is the original one, store the factory setting in SP2-003. If it is not, then store 16 in SP2-003.

Is the copier in fixed supply mode?

- No → Increase the value of the development bias correction for making VSP patterns (SP2-203) to make the VSP pattern lighter.
- Yes → Change the setting of SP2-208-001 to "3".

1.13 TONER SCATTERING

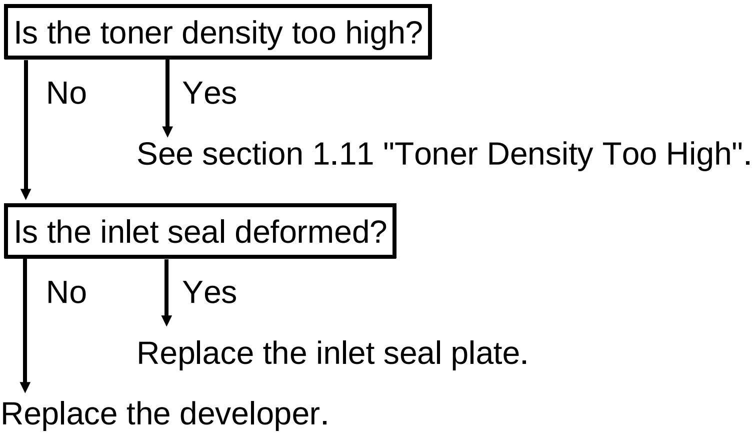
- Problem -

Toner scatters from the development unit.

- Possible Causes -

1. The toner density is too high.
2. The inlet seal on the development unit is out of position.
3. The developer has deteriorated.

- Action -


Is the toner density too high?
No
Yes
See section 1.11 "Toner Density Too High".
Is the inlet seal deformed?
No
Yes
Replace the inlet seal plate.
Replace the developer.

1.14 UNFUSED COPY

- Problem -

Solid black areas of the copy rub off easily.

- Possible Causes -

1. The fusing pressure is too low.
2. The fusing temperature is too low.
3. The thermistor is malfunctioning.

- Action -

Adjust the position of the pressure springs to increase the fusing pressure.

↓ No good

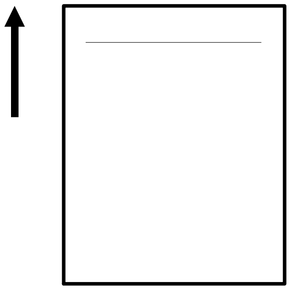
Increase the fusing temperature using SP1-105-001 (main fusing lamp) and SP-105-003 (secondary fusing lamp).

↓ No good

Check the thermistor. If the thermistor is malfunctioning, replace it.

1.15 A HORIZONTAL THIN LINE APPEARING CLOSE TO THE LEADING EDGE

- Problem -



When an original has solid black areas at the trailing edge, toner transferred from the trailing edge onto the hot roller will appear on the next sheet of copy paper.

- Action -

Adjust SP2-101-002 (trailing edge erase margin) to leave a blank margin at the trailing edge of copies.
(The blank margin can be adjusted from 0 to 16 mm in 0.5 mm steps when the leading edge registration is adjusted to 0 mm.)

1.16 CREASING AFTER FUSING

- Problem -

Under high humidity conditions, humidified copy paper creases as it comes out of the fusing unit.

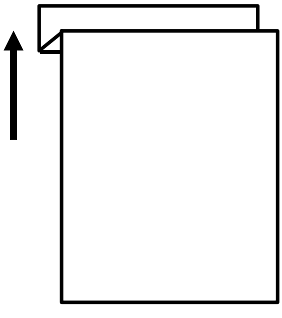
- Action -

Install an optional tray heater in each paper feeding station. Refer to "Tray Heater Installation" in section 3.
(The tray heater is available as a service part.)

1.17 Z-FOLDED COPY OR LEADING EDGE REGISTRATION VARIES

- Problem -

Copies are folded into a "Z" shape at the leading edge.
The variation in leading edge registration is too big.



- Action -

Adjust the amount of paper buckle between the registration rollers and the feed & separation rollers with SP1-003 for each paper feeding station.
See the SP mode table for details.

2. TONER SUPPLY CONTROL

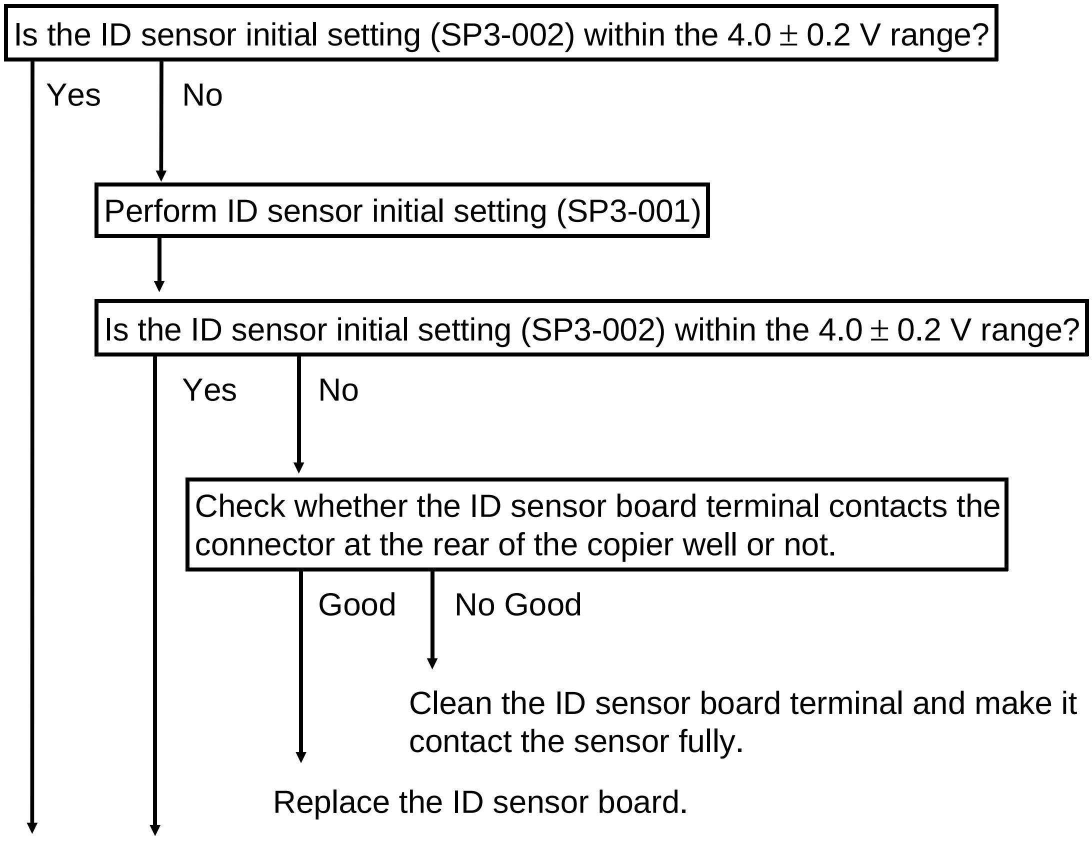
- Problem -

The manual ID level or ADS indicator blinks.

- Possible Causes -

1. Bad ID sensor board terminal contact
2. ID sensor adjustment error
3. Defective ID sensor
4. Dirty ID sensor
5. Bad TD sensor connector contact
6. TD sensor adjustment error
7. Defective TD sensor

- Action -



Is the ID sensor initial setting (SP3-002) within the 4.0 ± 0.2 V range?

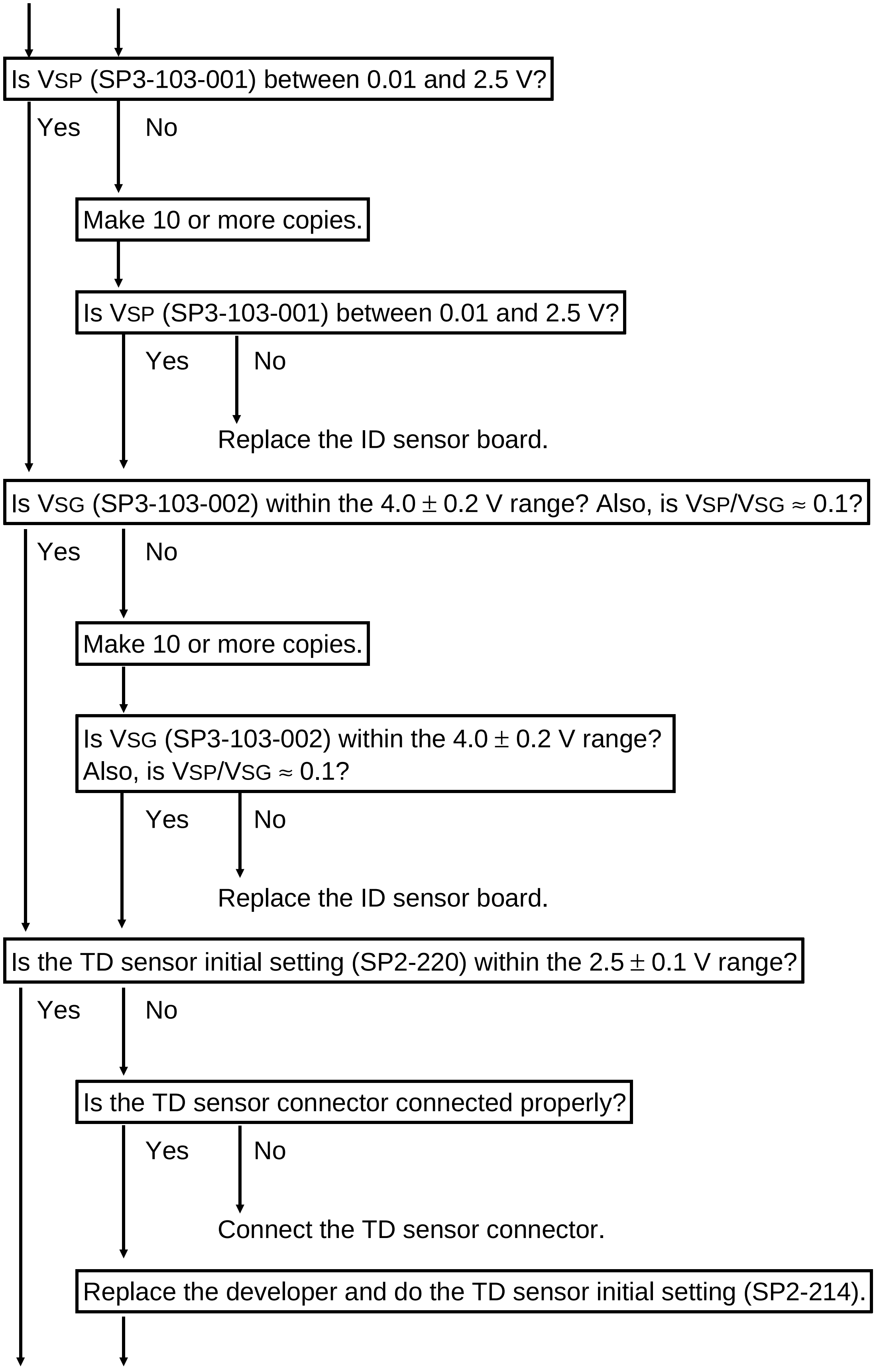
Perform ID sensor initial setting (SP3-001)

Is the ID sensor initial setting (SP3-002) within the 4.0 ± 0.2 V range?

Check whether the ID sensor board terminal contacts the connector at the rear of the copier well or not.

Clean the ID sensor board terminal and make it contact the sensor fully.

Replace the ID sensor board.



Is V_{SP} (SP3-103-001) between 0.01 and 2.5 V?

Yes

No

Make 10 or more copies.

Is V_{SP} (SP3-103-001) between 0.01 and 2.5 V?

Yes

No

Replace the ID sensor board.

Is V_{SG} (SP3-103-002) within the 4.0 ± 0.2 V range? Also, is $V_{SP}/V_{SG} \approx 0.1$?

Yes

No

Make 10 or more copies.

Is V_{SG} (SP3-103-002) within the 4.0 ± 0.2 V range?
Also, is $V_{SP}/V_{SG} \approx 0.1$?

Yes

No

Replace the ID sensor board.

Is the TD sensor initial setting (SP2-220) within the 2.5 ± 0.1 V range?

Yes

No

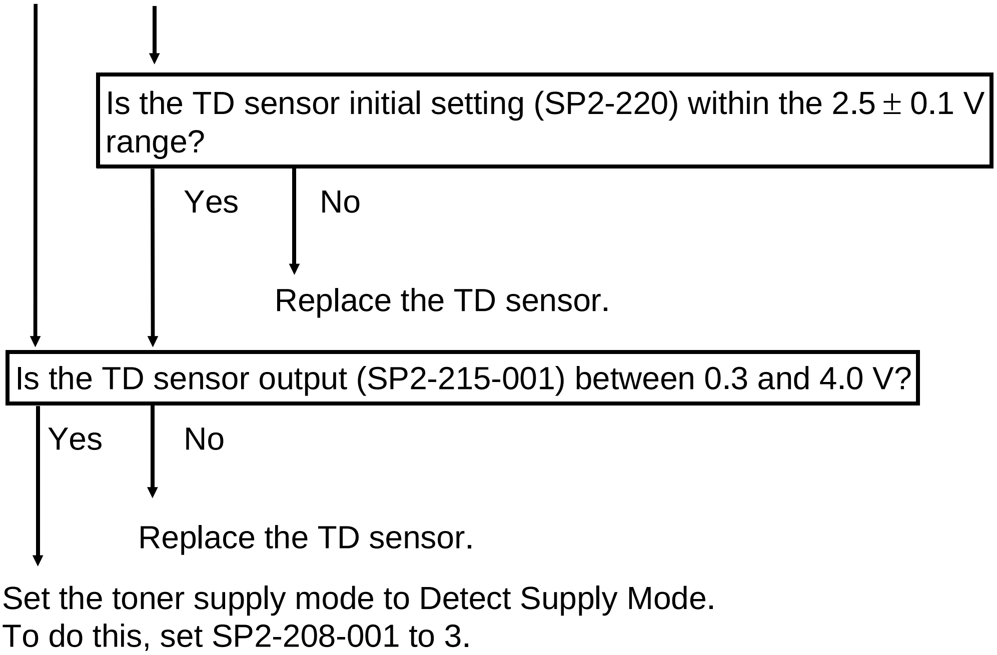
Is the TD sensor connector connected properly?

Yes

No

Connect the TD sensor connector.

Replace the developer and do the TD sensor initial setting (SP2-214).



Is the TD sensor initial setting (SP2-220) within the 2.5 ± 0.1 V range?

Yes

No

Replace the TD sensor.

Is the TD sensor output (SP2-215-001) between 0.3 and 4.0 V?

Yes

No

Replace the TD sensor.

Set the toner supply mode to Detect Supply Mode.
To do this, set SP2-208-001 to 3.

3. SERVICE CALL CONDITIONS

3.1 SUMMARY

When a service call condition occurs, SC codes are displayed in the copy counter. The first three digits are displayed in the copy counter. Hold down the "•" key to display the last two digits.

Example:
When the copier detects the E507 condition, "E-5" is displayed in the copy counter. Hold down the "•" key, and "07" is displayed in the copy counter.

There are 4 levels of service call conditions.

Level	Definition
A	The system goes down. The SC can only be reset by a service representative using SP5-810 (see the note below), to prevent the machine from being damaged. The copier cannot be operated at all.
B	The system goes down. The SC can be reset by turning the main switch off and on if the SC is caused by a detection error.
C	The copier can be operated as usual except for the unit or feature related to the service call.
D	Only the SC counter is incremented. The copier can be operated as usual.

NOTE: For safety reasons, Level A service calls cannot be cleared by turning the main switch off/on. The following procedure must be performed to clear these service call conditions after servicing the machine.

1. Turn on the main switch.
2. Enter SP5-810 (SC code reset) and press the Enter key.
3. Exit SP mode and turn the main switch off and on.

3.2 SC CODE TABLE

This table summarizes the SC codes.

SC Code No.	Description	Classification
E101	Exposure lamp error	A
E103	Frequency detection error	B
E120	Scanner home position error 1	B
E121	Scanner home position error 2	B
E124	Scanner drive motor error	B
E140	Lens vertical home position sensor error 1	B
E141	Lens vertical home position sensor error 2	B
E142	Lens horizontal home position sensor error 1	B
E143	Lens horizontal home position sensor error 2	B
E144	3rd scanner home position sensor error 1	B

SC Code No.	Description	Classification
E145	3rd scanner home position sensor error 2	B
E191	Auto ID sensor adjustment error	D
E302	Drum charge roller current leak	B
E346	Development bias leak	B
E351	ID sensor adjustment error	D
E352	TD sensor initial setting error	D
E353	V_{SP} abnormal (over 2.5 V)	D
E354	V_{SG} abnormal (under 2.5 V)	D
E355	TD sensor upper limit detection abnormal	D
E356	TD sensor lower limit detection abnormal	D
E405	Transfer belt/drum charge roller position abnormal	B
E440	Main motor lock	B
E442	Drum charge thermistor abnormal	D
E501	Main body upper tray lift motor error	C
E502	Main body lower tray lift motor error	C
E503	Paper tray unit 1st tray lift motor error	C
E504	Paper tray unit 2nd tray lift motor error	C
E505	Paper tray unit 3rd tray lift motor error	C
E506	Paper tray unit main motor lock	C
E507	LCT lift motor error	C
E522	Duplex tray end fence jogger h.p. sensor error 1	C
E523	Duplex tray end fence jogger h.p. sensor error 2	C
E524	Duplex tray side fence jogger h.p. sensor error 1	C
E525	Duplex tray side fence jogger h.p. sensor error 2	C
E541	Fusing unit thermistor open	A
E542	Fusing temperature warm-up error	A
E543	Fusing overheat	A
E544	Fusing overheat	A
E547	Continuous fusing lamp ON condition	A
E548	Fusing ready temperature abnormal	A
E620	Main board – ARDF communication error	C
E621	Main board – Sorter communication error	B
E623	Main board – Paper tray unit communication error	C
E720	Sorter timing sensor (roller drive) output error	B
E721	Sorter timing sensor (bin lift) output error	C
E722	Sorter jogger h.p. sensor output error	C
E723	Sorter grip h.p. sensor output error	C
E724	S/S stapler error	C
E900	Total counter error 1	B
E901	Total counter error 2	B

3.3 WARNING SC CODE TABLE

SC code	Description	SC Timing	Prohibited Function	Note
E501	Upper tray lift motor error	When the upper tray is selected	Paper feed from the upper tray	(1)
E502	Lower tray lift motor error	When the lower tray is selected	Paper feed from the lower tray	(2)
E503	1st tray lift motor error (Paper Tray Unit)	When that tray is selected	Paper feed from that tray	(3)
E504	2nd tray lift motor error (Paper Tray Unit)	When that tray is selected	Paper feed from that tray	(3)
E505	3rd tray lift motor error (Paper Tray Unit)	When that tray is selected	Paper feed from that tray	(3)
E506	Paper tray unit motor error	When a paper tray unit is selected	Paper feed from the paper tray unit	(4)
E507	LCT lift motor error	When the LCT is selected	Paper feed from the LCT	(5)
E522	Duplex tray end fence HP. not ON	When duplex mode is selected	Duplex mode	(6)
E523	Duplex tray end fence HP. not OFF	When duplex mode is selected	Duplex mode	(6)
E524	Duplex side fence jogger HP. not ON	When duplex mode is selected	Duplex mode	(6)
E525	Duplex side fence jogger HP. not OFF	When duplex mode is selected	Duplex mode	(6)
E620	Main board-ADF communication error	When an original is set on the ADF	ADF mode	(7)
E623	Main board-Paper tray unit communication error	When a paper tray unit is selected	Paper feed from the paper tray unit	(4)
E721	Sorter bin drive motor error	When sort mode is selected	Sort, stack, or staple mode	(8)
E722	Sorter jogger motor error	When sort mode is selected	Sort, stack, or staple mode	(8)
E723	Sorter grip motor error	When staple mode is selected	Staple mode	(8)
E724	Sorter stapler stapler motor error	When staple mode is selected	Staple mode	(8)

NOTE:

(1) A153/A155 copiers only
(2) A153/A155/A156 copiers only
(3) When a paper tray unit (500×2, 500×3) is installed
(4) When a paper tray unit is installed
(5) LCT machines only
(6) A156/A160 copiers only
(7) When an ADF is installed
(8) When a sorter stapler is installed

3.4 C-CODE TABLE

C-code	Condition	Message on LCD (A156 copier only)
C1	Front cover open	Cover open Close the front cover
C2	Paper exit cover open	—
C3	Paper tray unit cover open	Close the right side of paper tray unit
C4	LCT cover open	Cover open Close the LCT cover
C5	Sorter cover open or sorter not set	Close sorter cover or set the sorter
C6	ADF cover open	Cover open Close the ADF cover
C7	Right cover open	Close the right side of main copier unit

3.5 U-CODE TABLE

U-code	Condition	Message on LCD (A156 copier only)
U2	Key counter not set	Insert a key counter or enabling device/ Enter a user code
U6	Fusing unit not set	Open the front cover and reset the fusing unit
U7	Duplex unit not set	Insert the duplex unit

3.6 SC CODE DESCRIPTIONS

E101: Exposure lamp error

- Definition - [A]

The exposure lamp stays on for longer than 10 seconds. The temperature around the optics reflector reaches 121°C.

- Possible causes -

- Exposure lamp open
- Exposure lamp thermofuse open

E103: Frequency detection error

- Definition - [B]

The ac drive board (50/60Hz) did not receive a frequency in the 45 ~ 65 Hz range.

- Possible causes -

- Abnormal power supply
- Noise interference

E120: Scanner home position error 1

- Definition - [B]

The scanner home position sensor remains de-actuated for 7.5 seconds after the scanners start moving from the return position.

- Possible causes -

- Scanner home position sensor failure
- CN114 on the main board not connected correctly
- Incorrect scanner wire position

E121: Scanner home position error 2

- Definition - [B]

The scanner home position sensor remains actuated for 0.5 seconds after the scanner starts.

- Possible causes -

- Scanner home position sensor failure
- Defective scanner drive motor
- CN114 on the main control board not connected correctly
- Incorrect scanner wire position

E124: Scanner drive motor error

- Definition - [B]

During initialization and copying, the difference in the number of scanner drive motor steps between forward and reverse exceeds a certain number.

- Possible causes -

- Scanner movement too heavy
- Scanner drive motor defective
- Main control board defective

E140: Lens vertical home position sensor error 1

- Definition - [B]

The lens vertical home position sensor remains de-actuated 3.0 seconds after the lens starts returning to the home position.

- Possible causes -

- Lens vertical home position sensor defective
- Lens vertical drive motor defective
- DC power supply board defective (check FU303)

E141: Lens vertical home position sensor error 2

- Definition - [B]

The lens vertical home position sensor remains actuated 2.0 seconds after the lens left the home position.

- Possible Causes -

- Lens vertical home position sensor defective
- Lens vertical drive motor defective
- CN116 on the main control board is not connected correctly
- DC power supply board defective (check FU303)

E142: Lens horizontal home position sensor error 1

- Definition - [B]

The lens horizontal home position sensor remains de-actuated 3.7 seconds after the lens starts returning to the home position.

- Possible Causes -

- Lens horizontal home position sensor defective
- Lens horizontal drive motor defective
- DC power supply board defective (check FU303)

E143: Lens horizontal home position sensor error 2

- Definition - [B]

The lens horizontal home position sensor remains actuated 2.0 seconds after the lens left the home position.

- Possible Causes -

- Lens horizontal home position sensor defective
- Lens horizontal drive motor defective
- CN120 on the main control board not connected correctly
- DC power supply board defective (check FU303)

E144: 3rd scanner home position sensor error 1

- Definition - [B]

The 3rd scanner home position sensor remains de-activated 1.0 second after the 3rd scanner starts returning to the home position.

- Possible Causes -

- 3rd scanner home position sensor defective
- 3rd scanner drive motor defective
- DC power supply board defective (check FU303)

E145: 3rd scanner home position sensor error 2

- Definition - [B]

The 3rd scanner home position sensor remains actuated 3.7 seconds after the 3rd scanner left the home position.

- Possible Causes -

- 3rd scanner home position sensor defective
- 3rd scanner drive motor defective
- DC power supply board defective (check FU303)

E191: Auto ID sensor adjustment error (at the 1K copies process control)

- Definition - [D]

1. ADS sensor output is lower than the 2.7 V target at the maximum gain for the sensor.
2. ADS sensor output is higher than the 2.7 V target at the minimum gain for the sensor.

- Possible Causes -

- ADS sensor board defective
- ADS sensor board poorly connected
- Main control board defective

E302: Drum charge roller current leak

- Definition - [B]

A charge current leak signal is detected.

- Possible Causes -

- Drum charge roller unit defective
- CB high voltage supply board defective

E346: Development bias leak

- Definition - [B]

A development bias leak signal is detected.

- Possible Causes -

- Sleeve roller receptacle damage
- CB high voltage supply board defective

E351: ID sensor adjustment error

- Definition - [D]

When the ID sensor output (VSG) falls out of the adjustment target (3.8 ~ 4.2 V) during the process control self check.

- Possible Causes -

- ID sensor board defective
- Dirty ID sensor
- Main control board defective

E352: TD sensor initial setting error

- Definition - [D]

TD sensor output does not reach a value between 2.4 and 2.6 V when performing the developer initial setting procedure.

- Possible Causes -

- TD sensor defective
- Main control board defective
- TD sensor connector is disconnected.

E353: VSP abnormal

- Definition - [D]

The detected VSP goes above 2.5 volts.

- Possible Causes -

- Dirty ID sensor
- ID sensor board defective
- Main control board defective

E354: VSG abnormal

- Definition - [D]

Detected VSG is equal to or is below 2.5 volts.

- Possible Causes -

- Dirty ID sensor
- ID sensor board defective
- Main control board defective

E355: TD sensor upper limit detection abnormal

- Definition - [D]

TD sensor output exceeds 4.0 volts during copy cycles.

- Possible Causes -

- TD sensor defective
- Main control board defective
- Toner supply system defective

E356: TD sensor lower limit detection abnormal

- Definition - [D]

TD sensor output falls below than 0.3 volts during copy cycles.

- Possible Causes -

- TD sensor defective
- Main control board defective
- Toner supply system defective
- TD sensor connector is disconnected.

E405: Transfer belt/drum charge roller position abnormal

- Definition - [B]

The transfer belt contact home position sensor is not activated.

- Possible Causes -

- Transfer belt contact home position sensor defective
- Transfer belt contact clutch defective
- Main control board defective

E440: Main motor lock

- Definition - [B]

A main motor lock signal is detected.

- Possible Causes -

- Too much load on the drive mechanism
- Main motor defective or poor connection
- Main motor control board defective
- Main control board defective

E442: Drum charge thermistor abnormal

- Definition - [D]

The temperature detected by the drum charge thermistor drops below 0 °C or rises above 100 °C.

- Possible Causes -

- Drum charge thermistor open
- Main control board defective

E501: Main body upper tray lift motor abnormal (A153/A155 only)

E502: Main body lower tray lift motor abnormal (A153/A155/A156 only)

E503: Paper tray unit 1st tray lift motor abnormal (A549/A550 optional paper tray unit only)

E504: Paper tray unit 2nd tray lift motor abnormal (A549/A550 optional paper tray unit only)

E505: Paper tray unit 3rd tray lift motor abnormal (A549/A550 optional paper tray unit only)

- Definition - [C]

The paper limit sensor is not actuated after the tray lift motor has been on for 10.0 seconds.

- Possible Causes -

- Upper limit sensor defective
- Tray lift motor defective
- Main control board defective

E506: Paper tray unit main motor lock (A549/A550/A553 optional paper tray unit only)

- Definition - [C]

A paper tray unit main motor lock signal is detected.

- Possible Causes -

- Paper tray unit main motor defective
- Interface board defective
- Main control board defective

E507: LCT lift motor abnormal (A155/A156/A159/A160 only)

- Definition - [C]

The LCT upper limit sensor is not actuated after the LCT lift motor has been on for 15.0 seconds.

- Possible Causes -

- LCT upper limit sensor defective
- LCT lift motor defective
- LCT interface board defective
- Main control board defective

E522: End fence jogger home position sensor error 1 (A156/A160 only)

- Definition - [C]

The end fence jogger home position sensor remains de-actuated for 8.0 seconds when the jogger home position initialization procedure is performed.

- Possible Causes -

- End fence jogger home position sensor defective
- End fence jogger motor defective
- Duplex control board defective
- Main control board defective

E523: End fence jogger home position sensor error 2 (A156/A160 only)

- Definition - [C]

The end fence jogger home position sensor remains actuated for 1.0 second when the jogger home position initialization procedure is performed.

- Possible Causes -

- End fence jogger home position sensor defective
- End fence jogger motor defective
- Duplex control board defective
- Main control board defective

E524: Side fence jogger home position sensor error 1 (A156/A160 only)

- Definition - [C]

The side fence jogger home position sensor remains de-actuated for 5.0 seconds when the jogger home position initialization procedure is performed.

- Possible Causes -

- Side fence jogger home position sensor defective
- Side fence jogger motor defective
- Duplex control board defective
- Main control defective

E525: Side fence jogger home position sensor error 2 (A156/A160 only)

- Definition - [C]

The side fence jogger home position sensor remains actuated for 1.0 second when the jogger home position initialization procedure is performed.

- Possible Causes -

- Side fence jogger home position sensor defective.
- Side fence jogger motor defective
- Duplex control board defective
- Main control defective

E541: Fusing thermistor open

- Definition - [A]

The output of the fusing thermistor (TH1 or TH2 or both) goes to 5 volts, corresponding to 0°C.

- Possible Causes -

- Fusing thermistor open
- Main control board defective
- Fusing lamp open

E542: Fusing temperature warm-up error

- Definition - [A]

The fusing temperature does not reach the ready temperature within 3.0 minutes after the main switch is turned on.

- Possible Causes -

- Fusing thermistor defective or out of position
- Fusing lamp open
- Fusing thermofuse open
- AC drive board defective (check the triac)

E543: Fusing overheat (measured directly from the thermistor)

- Definition - [A]

A fusing temperature of over 230 °C is detected 5 times (this takes 5 seconds).

- Possible Causes -

- Fusing thermistor defective
- AC drive board defective (check the triac)
- Main control board defective

E544: Fusing overheat (back-up for E543)

- Definition - [A]

A fusing temperature of over 250 °C is detected 5 times by the main control board (this takes 5 seconds)

- Possible Causes -

- AC drive board defective (check the triac)
- Fusing thermistor defective
- Main control board defective

E547: Continuous fusing lamp on condition

- Definition - [A]

The fusing lamp stays on at full power for 70.0 seconds while in the stand-by condition after warm-up is completed.

- Possible Causes -

- Fusing thermistor defective

E548: Fusing ready temperature abnormal

- Definition - [A]

The fusing temperature goes 40 °C below or 40 °C over the stand-by temperature after warm-up is completed.

- Possible Causes -

- Fusing thermistor connector not connected properly

E620: Communication error between main control board and ARDF

- Definition - [C]

The main CPU cannot start communication with the ARDF properly.

- Possible Causes -

- Poor connection between the main control board and ARDF
- Main control board defective
- DF main board defective

E621:Communication error between main control board and sorter

- Definition - [B]

The main CPU cannot start communication with the sorter properly.

- Possible Causes -

- Poor connection between the main control board and the sorter
- Main control board defective
- Sorter main board defective

E623: Communication error between main control board and paper tray unit

- Definition - [C]

The main CPU cannot start communication with the paper tray unit properly.

- Possible Causes -

- Poor connection between the main control board and the paper tray unit
- Main control board defective
- Paper tray unit interface board defective

E720 - Timing Sensor (Roller Drive) Output Error (A554/A555)

- Definition - [B]

When the roller drive/transport motor is turning, the timing sensor takes over 500 ms to change.

- Possible Causes -

- The timing sensor is defective.
- The rroller drive/transport motor is defective.
- The main control board is defective.

E721 - Timing Sensor (Bin Lift) Output Error (A554/A555)

- Definition - [C]

When the bin lift/bin drive motor is turning, the timing sensor takes over 250 ms to change.

- Possible Causes -

- The timing sensor is defective.
- The bin lift/bin drive motor is defective.
- The main control board is defective.

E722 - Jogger Home Position Sensor Output Error (A554/A555)

- Definition- [C]

- When the jogger bar moves forward, the home position sensor takes over 100 ms to be deactivated.
- When the jogger bar moves backward, the home position sensor takes over 800 ms to be activated.

- Possible Causes -

- The jogger home position sensor is defective.
- The jogger motor is defective.
- The main control board is defective.

E723 - Grip Home Position Sensor Output Error (A554/A555)

- Definition- [C]

- When the grip motor rotates, the grip home position sensor takes over 0.2 s to be deactivated.
- When the grip motor rotates in reverse, the grip home position sensor takes over 2.5 s to be deactivated.

- Possible Causes -

- The grip home position sensor is defective.
- The grip motor is defective.
- The main control board is defective.

E724 - Stapler Error (A554/A555)

- Definition- [C]

The stapler motor takes more than 800 ms for one staple operation (from home position to home position).

- Possible Causes -

- The stapler is defective.
- The main control board is defective.

E900: Total counter error 1

- Definition - [B]

The total counter does not turn on.

- Possible Causes -

- Total counter defective
- CN121 on the main control board not connected correctly

E901: Total counter error 2

- Definition - [B]

The total counter does not turn off.

- Possible Causes -

- Total counter defective

4. BLOWN FUSE CONDITIONS

Fuse	Rating		Symptom when turning on the Main Switch
	115 V	220 ~ 240 V	
DC Power Supply Board			
FU301	8 A/125 V	5 A/250 V	No response
FU302	6.3 A/125 V	6.3 A/250 V	Copying is disabled. Paper jam at location A when the Print key is pressed.
FU303	6.3 A/125 V	6.3 A/250 V	E140, E141, E142, E143, E144, or E145 lights depending on the peripherals that are attached to the copier.
FU304	6.3 A/125 V	6.3 A/250 V	C5 lights on machines that have a sorter installed. Also the DF does not communicate with the copier (the DF stays off).
AC Drive Board (for 115 V machines only)			
FU371	15 A/125 V	—	No response

5. ELECTRICAL COMPONENT DEFECTS

5.1 SENSORS

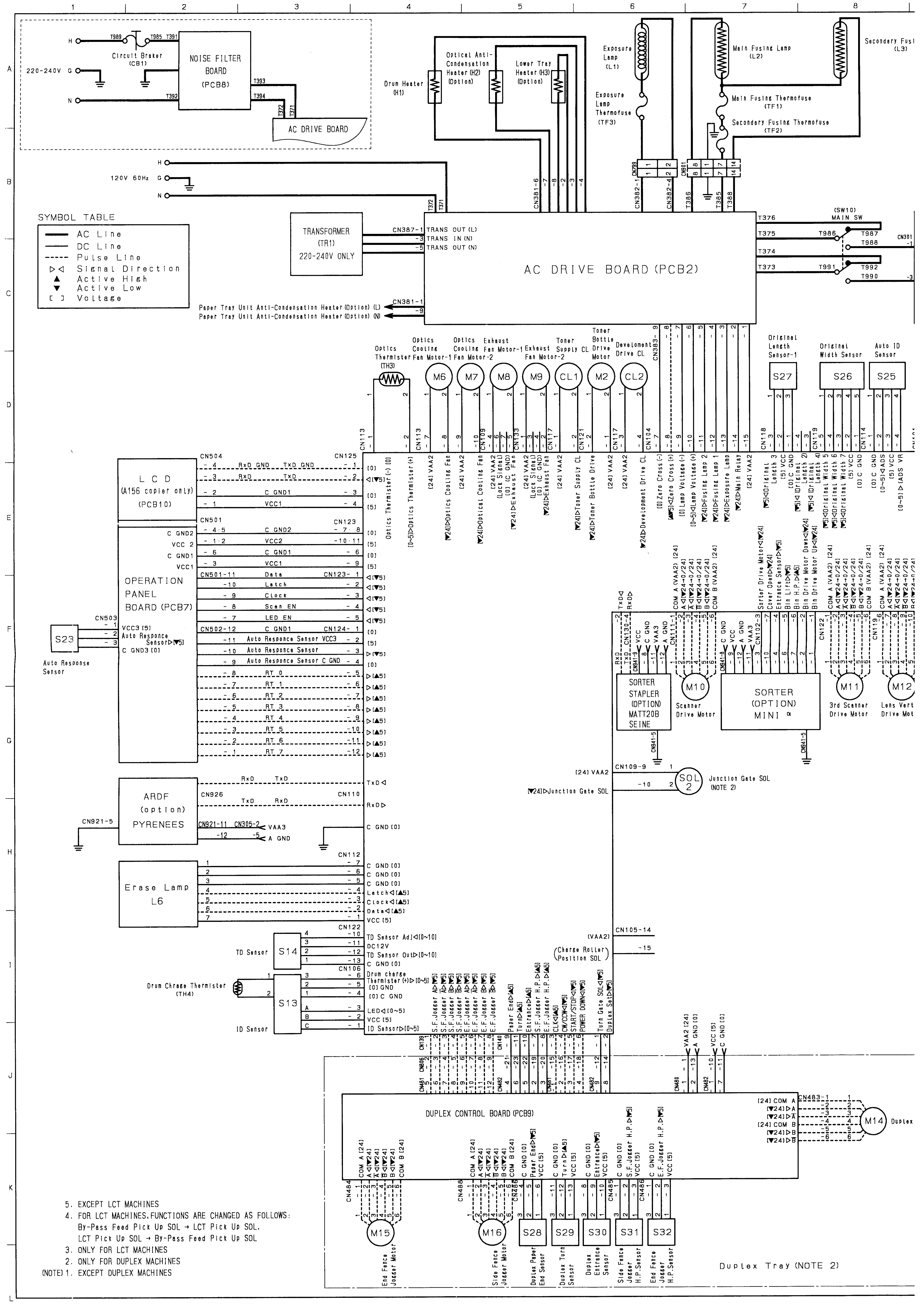
Component (Symbol)	CN	Condition	Symptom (When the main switch is turned on.)
By-pass Feed Paper Width (S1)	126-9~12	Open	The copier does not turn on.
		Shorted	The CPU cannot detect the proper paper size.
By-pass Feed Paper End (S2)	126-7	Open	The Paper End indicator lights even if paper is placed on the by-pass feed table.
		Shorted	The Paper End indicator does not light even if there is no paper on the by-pass feed table.
Upper Tray Paper End [Non-duplex machines only] (S3)	131-2	Open	The Paper End indicator lights even if paper is placed on the by-pass feed table.
		Shorted	The Paper End indicator does not light even if there is no paper on the by-pass feed table.
Upper Relay (S4)	128-4	Open	Paper jam type A occurs whenever a copy is made.
		Shorted	The Paper Jam A indicator lights even if there is no paper.
Upper Tray Upper Limit [A153/A155 machines only] (S5)	131-8	Open	The Paper End indicator lights even if there is paper on the tray.
		Shorted	The tray bottom plate locks at the upper position.
Lower Tray Paper End (S6)	134-2	Open	The Paper End indicator lights even if paper is present.
		Shorted	The Paper End indicator does not light even if there is no paper.
Lower Relay (S7)	128-1	Open	A paper jam type A occurs whenever a copy is made.
		Shorted	The Paper Jam A indicator lights even if there is no paper.
Lower Tray Upper Limit [A153/A155/ A156 mchines only] (S8)	134-8	Open	The Paper End indicator lights even if there is paper on the tray.
		Shorted	The tray bottom plate locks at the upper position.
LCT Lower Limit [LCT machines only] (S9)	132-10	Open	The LCT bottom plate does not lower.
		Shorted	When the bottom plate is lowered, it locks at the lowest position.
LCT Paper End [LCT machines only] (S10)	129-7	Open	The Paper End indicator lights even if there is paper in the LCT.
		Shorted	The Paper End indicator does not light even if there is no paper.

Component (Symbol)	CN	Condition	Symptom (When the main switch is turned on.)
LCT Upper Limit [LCT machines only] (S11)	129-4	Open	The bottom plate does not rise even if paper is placed in the LCT.
		Shorted	The bottom plate rises and locks at the upper position.
Registration (S12)	128-8	Open	A paper jam type A occurs whenever a copy is made.
		Shorted	The Paper Jam A indicator lights even if there is no paper.
Imge Density (S13)	106-1	Open	A VSP/VSG abnormal condition occurs. (The Manual or Auto I/D indicator blinks.)
		Shorted	
Toner Density (S14)	122-12	Open	E355 is displayed.
		Shorted	E356 is displayed.
Lens Horizontal HP (S15)	120-2	Open	E143 is displayed.
		Shorted	E142 is displayed.
Lens Vertical HP (S16)	116-2	Open	E141 is displayed.
		Shorted	E140 is displayed.
Scanner HP (S17)	114-6	Open	E121 is displayed.
		Shorted	E120 is displayed.
3rd Scanner HP (S18)	116-5	Open	E144 is displayed.
		Shorted	E145 is displayed.
Original Length-2 (S19)	118-7	Open	The CPU cannot detect the original size properly. APS and ARE do not function correctly.
		Shorted	
Fusing Exit (S20)	109-2	Open	A paper jam type B occurs whenever a copy is made.
		Shorted	The Paper Jam B indicator lights even if there is no paper.
Platen Cover (S21)	113-4	Open	APS and ARE do not function properly.
		Shorted	No symptom
Toner End (S22)	122-8	Open	Toner is added even if there is a sufficient amount of toner inside the toner supply unit.
		Shorted	Toner is not supplied even if there is no toner inside the toner supply unit.
Auto Response (S23)	503-2	Open	The copier does not exit the "Energy Saver" mode even if an operator approaches the machine.
		Shorted	"Energy Saver" mode does not work.
Transfer Belt Contract HP (S24)	105-12	Open	No symptom
		Shorted	E405 is displayed.
Auto Image Density [ADS Sensor] (S25)	114-2	Open	The image density will be abnormal.
		Shorted	
Original Width (S26)	119-2~5	Open	The CPU cannot detect the original size properly. APS and ARE do not function correctly.
		Shorted	

Component (Symbol)	**CN**	**Condition**	**Symptom (When the main switch is turned on.)**
Original Length-1 (S27)	118-3	Open	The CPU cannot detect the original size properly. APS and ARE do not function correctly.
		Shorted	
Duplex Paper End [Duplex machines only] (S28)	486-5	Open	"Copies Left In The Duplex Tray" is displayed or the Paper Jam Z indicator lights even if there is no paper in the duplex tray.
		Shorted	Only one rear side copy is made regardless of the quantity of copies.
Duplex Turn [Duplex machines only] (S29)	140-9	Open	The machine indicates that originals should be reset.
		Shorted	"Copies Left In The Duplex Tray" is displayed or the Paper Jam Z indicator lights even if there is no paper in the duplex tray.
Duplex Entrance [Duplex machines only] (S30	140-10	Open	"Copies Left In The Duplex Tray" is displayed or the Paper Jam Z indicator lights even if there is no paper in the duplex tray.
		Shorted	The Paper Jam C indicator lights even if there is no paper.
Side Fence Jogger HP [Duplex machines only] (S31)	140-7	Open	E525 is displayed.
		Shorted	E524 is displayed.
End Fence Jogger HP [Duplex machines only] (S32)	140-8	Open	E523 is displayed.
		Shorted	E522 is displayed.
Original Length [Option for N. American models] (S33)	118-7	Open	The CPU cannot detect the original size properly. APS and ARE do not function correctly.
		Shorted	

5.2 SWITCHES

Component	CN No.	condition	Symptom
By-pass Feed Table (SW1)	126-4	Open	The copier does not turn on.
		Shorted	By-pass feed cannot be selected.
Upper Tray [Non-duplex machines only] (SW2)	138-2	Open	The copier does not turn on.
		Shorted	The user can select the tray even if it is not in place; the Print key is active.
Lower Tray (SW3)	137-2	Open	The copier does not turn on.
		Shorted	The user can select the tray even if it is not in place; the Print key is active.
Tray Down [LCT machines only] (SW4)	132-6	Open	The LCT bottom plate does not lower.
		Shorted	The LCT bottom plate lowers even if there is paper in the LCT.
Upper Tray Paper Size [Non-duplex machines only] (SW5)	138-3~7	Open	The CPU cannot detect the proper paper size, and misfeeds may occur when a copy is made.
		Shorted	
Lower Tray Paper Size (SW6)	137-3~7	Open	The CPU cannot detect the proper paper size, and misfeeds may occur when a copy is made.
		Shorted	
Vertical Guide Set [Non-LCT machines only] (SW7)	127-8	Open	The power goes down when the vertical guide is opened.
		Shorted	The copier does not turn on.
LCT Cover-1 [LCT machines only] (SW8)	132-11	Open	The LCT bottom plate lowers even if there is paper in the LCT.
		Shorted	The LCT bottom plate does not rise even if the cover is closed.
LCT Cover-2 [LCT machines only] (SW9)	701-7	Open	E507 is displayed or the LCT bottom plate does not rise or lower.
		Shorted	
Main (SW10)	–	Open	The copier does not turn on.
		Shorted	The copier does no turn off.
Front Cover Safety (SW11)	–	Open	"C1" is displayed even if the front cover is closed.
		Shorted	"C1" is not displayed even if the front cover is opened.
Exit Cover Safety [A157/A159/A160 machines only] (SW12)	109-11	Open	"C2" is displayed even if the front cover is closed.
		Shorted	"C2" is not displayed even if the front cover is opened.



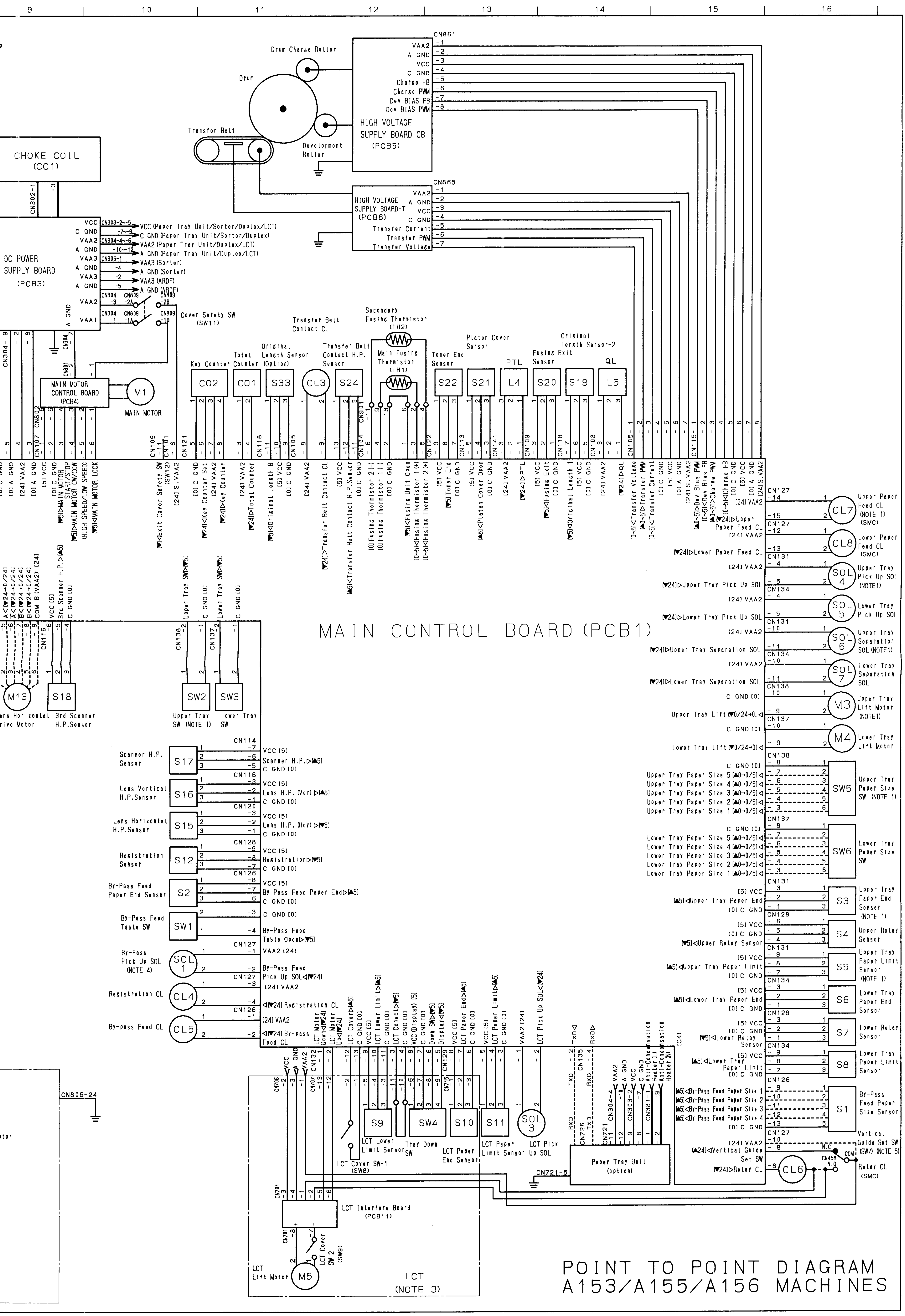
220-240V
Circuit Braker (CB1)
NOISE FILTER BOARD (PCB8)
AC DRIVE BOARD
120V 60Hz
TRANSFORMER (TR1) 220-240V ONLY
TRANS OUT (L)
TRANS IN (N)
TRANS OUT (N)
AC DRIVE BOARD (PCB2)
Paper Tray Unit Anti-Condensation Heater (Option) (L)
Paper Tray Unit Anti-Condensation Heater (Option) (N)
Drum Heater (H1)
Optical Anti-Condensation Heater (H2) (Option)
Lower Tray Heater (H3) (Option)
Exposure Lamp (L1)
Exposure Lamp Thermofuse (TF3)
Main Fusing Lamp (L2)
Main Fusing Thermofuse (TF1)
Secondary Fusing Thermofuse (TF2)
Secondary Fusi (L3)
(SW10) MAIN SW
Optics Thermister (TH3)
Optics Cooling Fan Motor-1 M6
Optics Cooling Fan Motor-2 M7
Exhaust Fan Motor-1 M8
Exhaust Fan Motor-2 M9
Toner Supply CL CL1
Toner Bottle Drive Motor M2
Development Drive CL CL2
Original Length Sensor-1 S27
Original Width Sensor S26
Auto ID Sensor S25
L C D (A156 copier only) (PCB10)
OPERATION PANEL BOARD (PCB7)
S23 Auto Response Sensor
ARDF (option) PYRENEES
Erase Lamp L6
TD Sensor S14
Drum Chrage Thermister (TH4)
S13 ID Sensor
SORTER STAPLER (OPTION) MATT20B SEINE
M10 Scanner Drive Motor
SORTER (OPTION) MINI α
M11 3rd Scanner Drive Motor
M12 Lens Vert Drive Mot
SOL 2 Junction Gate SOL (NOTE 2)
Charge Roller Position SOL
DUPLEX CONTROL BOARD (PCB9)
M14 Duplex
M15 End Fence Jogger Motor
M16 Side Fence Jogger Motor
S28 Duplex Paper End Sensor
S29 Duplex Turn Sensor
S30 Duplex Entrance Sensor
S31 Side Fence Jogger H.P.Sensor
S32 End Fence Jogger H.P.Sensor
Duplex Tray (NOTE 2)

SYMBOL TABLE

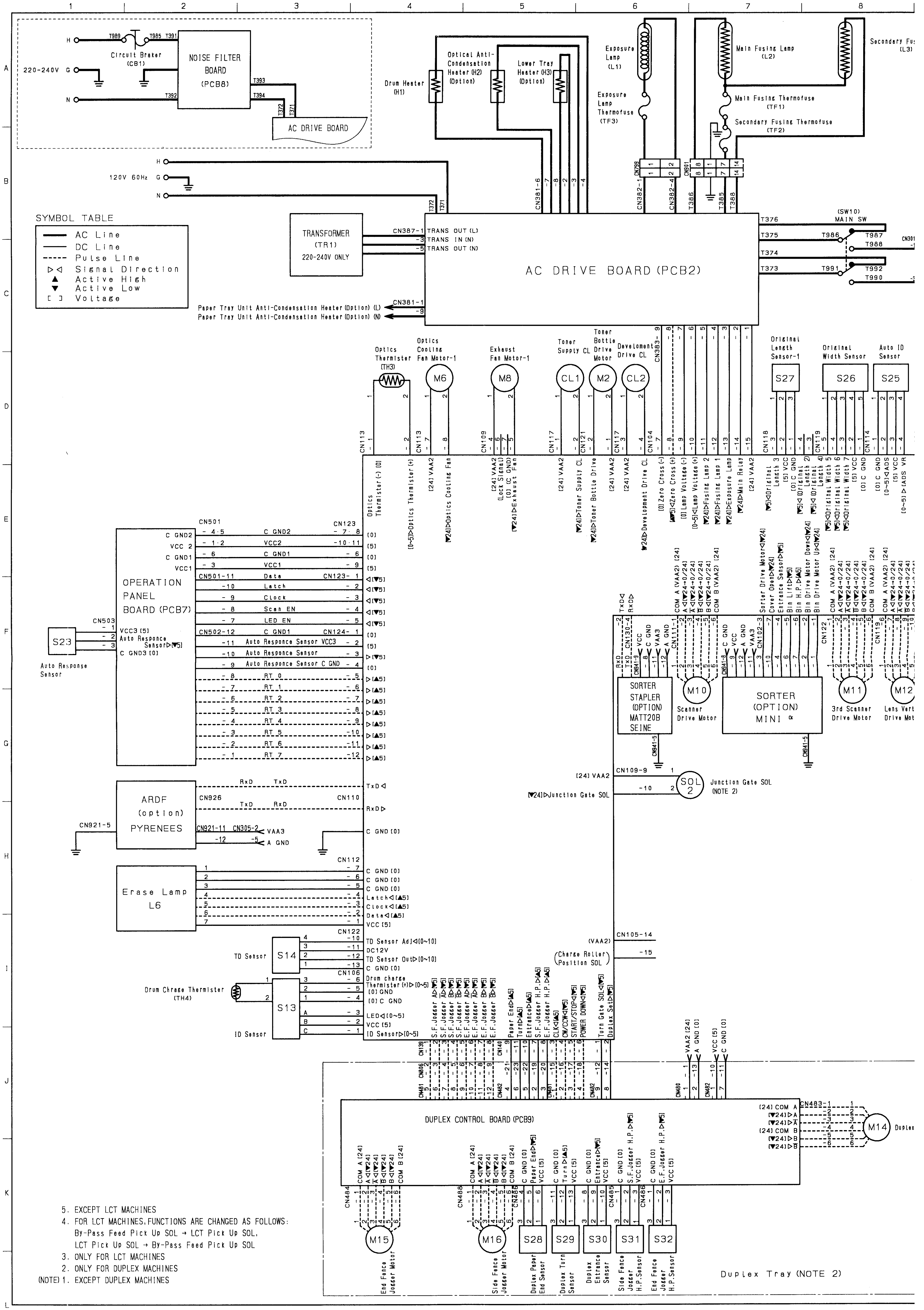
━━	AC Line
──	DC Line
-----	Pulse Line
▷◁	Signal Direction
▲	Active High
▼	Active Low
[ ]	Voltage

5. EXCEPT LCT MACHINES
4. FOR LCT MACHINES, FUNCTIONS ARE CHANGED AS FOLLOWS:
   By-Pass Feed Pick Up SOL → LCT Pick Up SOL,
   LCT Pick Up SOL → By-Pass Feed Pick Up SOL
3. ONLY FOR LCT MACHINES
2. ONLY FOR DUPLEX MACHINES

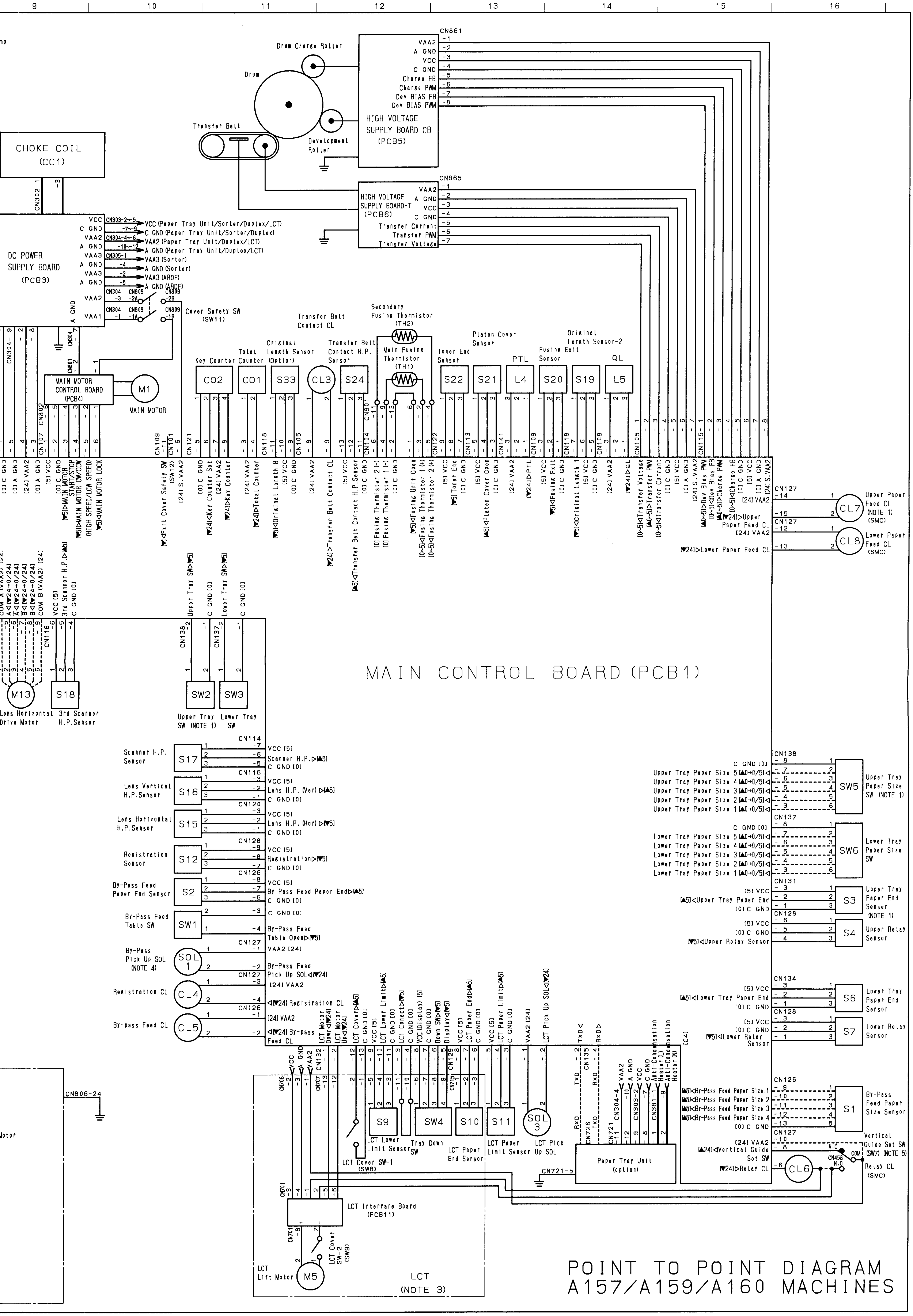
(NOTE) 1. EXCEPT DUPLEX MACHINES


9
10
11
12
13
14
15
16
Drum Charge Roller
Drum
Transfer Belt
Development Roller
CN861
VAA2
A GND
VCC
C GND
Charge FB
Charge PWM
Dev BIAS FB
Dev BIAS PWM
HIGH VOLTAGE SUPPLY BOARD CB (PCB5)
CN865
HIGH VOLTAGE SUPPLY BOARD-T (PCB6)
Transfer Current
Transfer PWM
Transfer Voltage
CHOKE COIL (CC1)
CN302-1
DC POWER SUPPLY BOARD (PCB3)
VCC (Paper Tray Unit/Sorter/Duplex/LCT)
C GND (Paper Tray Unit/Sorter/Duplex)
VAA2 (Paper Tray Unit/Duplex/LCT)
A GND (Paper Tray Unit/Duplex/LCT)
VAA3 (Sorter)
A GND (Sorter)
VAA3 (ARDF)
A GND (ARDF)
Cover Safety SW (SW11)
MAIN MOTOR CONTROL BOARD (PCB4)
M1
MAIN MOTOR
Key Counter
Total Counter
Original Length Sensor (Option)
Transfer Belt Contact CL
Transfer Belt Contact H.P. Sensor
Secondary Fusing Thermistor (TH2)
Main Fusing Thermistor (TH1)
Toner End Sensor
Platen Cover Sensor
PTL
Fusing Exit Sensor
Original Length Sensor-2
QL
CO2
CO1
S33
CL3
S24
S22
S21
L4
S20
S19
L5
MAIN CONTROL BOARD (PCB1)
M13
Lens Horizontal Drive Motor
S18
3rd Scanner H.P.Sensor
SW2
SW3
Upper Tray SW (NOTE 1)
Lower Tray SW
Scanner H.P. Sensor
S17
Lens Vertical H.P.Sensor
S16
Lens Horizontal H.P.Sensor
S15
Registration Sensor
S12
By-Pass Feed Paper End Sensor
S2
By-Pass Feed Table SW
SW1
By-Pass Pick Up SOL (NOTE 4)
SOL 1
Registration CL
CL4
By-pass Feed CL
CL5
CN806-24
LCT Cover SW-1 (SW8)
S9
LCT Lower Limit Sensor
SW4
Tray Down SW
S10
LCT Paper End Sensor
S11
LCT Paper Limit Sensor
SOL 3
LCT Pick Up SOL
LCT Interface Board (PCB11)
LCT Cover SW-2 (SW9)
M5
LCT Lift Motor
LCT (NOTE 3)
Paper Tray Unit (option)
CN721-5
Upper Paper Feed CL (NOTE 1) (SMC)
CL7
Lower Paper Feed CL (SMC)
CL8
Upper Tray Pick Up SOL (NOTE1)
SOL 4
Lower Tray Pick Up SOL
SOL 5
Upper Tray Separation SOL (NOTE1)
SOL 6
Lower Tray Separation SOL
SOL 7
Upper Tray Lift Motor (NOTE1)
M3
Lower Tray Lift Motor
M4
Upper Tray Paper Size SW (NOTE 1)
SW5
Lower Tray Paper Size SW
SW6
Upper Tray Paper End Sensor (NOTE 1)
S3
Upper Relay Sensor
S4
Upper Tray Paper Limit Sensor (NOTE 1)
S5
Lower Tray Paper End Sensor
S6
Lower Relay Sensor
S7
Lower Tray Paper Limit Sensor
S8
By-Pass Feed Paper Size Sensor
S1
Vertical Guide Set SW (SW7) (NOTE 5)
Relay CL (SMC)
CL6
CN458

POINT TO POINT DIAGRAM
A153/A155/A156 MACHINES

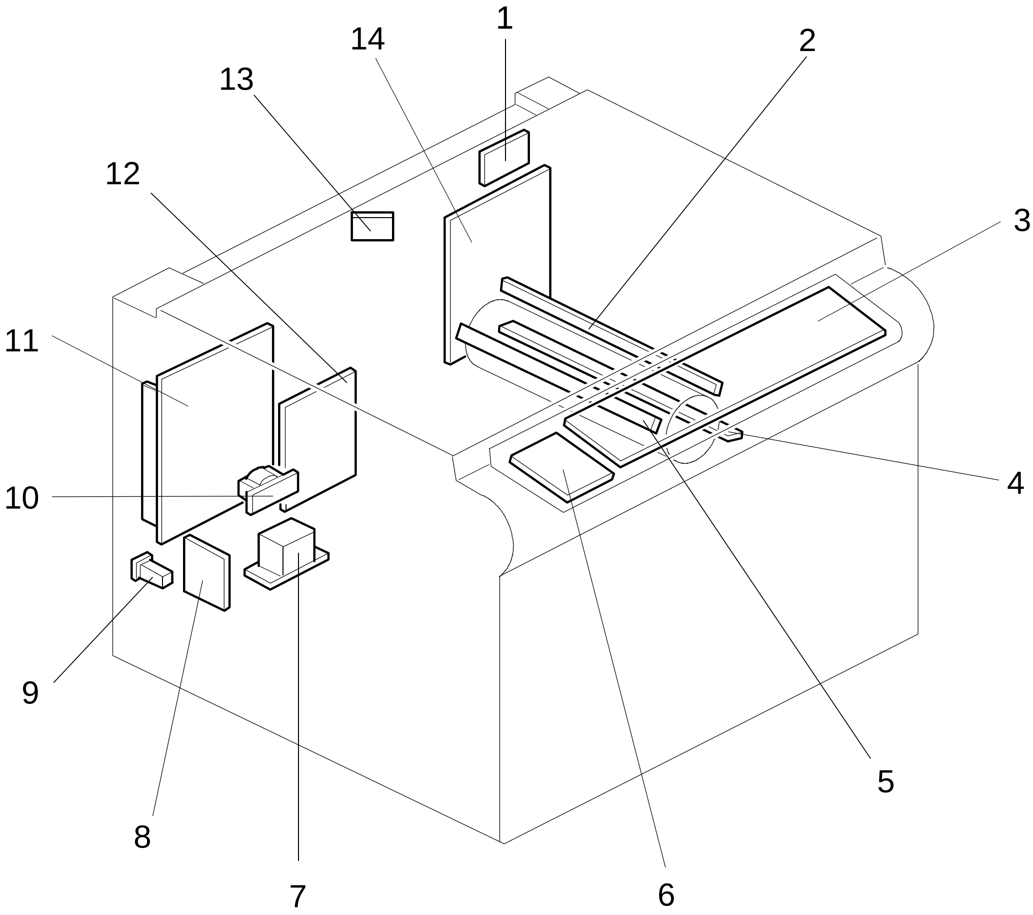

1
2
3
4
5
6
7
8
A
B
C
D
E
F
G
H
I
J
K
L
220-240V
H
G
N
T989
T985
T391
Circuit Braker (CB1)
NOISE FILTER BOARD (PCB8)
T393
T392
T394
T372
T371
AC DRIVE BOARD
120V 60Hz
SYMBOL TABLE
AC Line
DC Line
Pulse Line
▷◁ Signal Direction
▲ Active High
▼ Active Low
[ ] Voltage
TRANSFORMER (TR1) 220-240V ONLY
CN387-1 TRANS OUT (L)
-3 TRANS IN (N)
-5 TRANS OUT (N)
AC DRIVE BOARD (PCB2)
CN381-1
-9
Paper Tray Unit Anti-Condensation Heater (Option) (L)
Paper Tray Unit Anti-Condensation Heater (Option) (N)
Drum Heater (H1)
Optical Anti-Condensation Heater (H2) (Option)
Lower Tray Heater (H3) (Option)
Exposure Lamp (L1)
Exposure Lamp Thermofuse (TF3)
Main Fusing Lamp (L2)
Main Fusing Thermofuse (TF1)
Secondary Fusing Thermofuse (TF2)
Secondary Fu… (L3)
CN381-6
CN382-1
CN382-4
CN799
CN901
T386
T385
T388
T376
T375
T374
T373
(SW10) MAIN SW
T986
T987
T988
T991
T992
T990
CN301
Optics Thermistor (TH3)
Optics Cooling Fan Motor-1
M6
Exhaust Fan Motor-1
M8
Toner Supply CL
CL1
Toner Bottle Drive Motor
M2
Development Drive CL
CL2
Original Length Sensor-1
S27
Original Width Sensor
S26
Auto ID Sensor
S25
CN113
CN109
CN117
CN121
CN104
CN383
CN118
CN119
CN114
Optics Thermistor (-) [0]
[0~5]▷Optics Thermistor (+)
[24] VAA2
[▼24]▷Optics Cooling Fan
[24] VAA2
(Lock Signal)
[0] (C GND)
[▼24]▷Exhaust Fan
[24] VAA2
[▼24]▷Toner Supply CL
[▼24]▷Toner Bottle Drive
[24] VAA2
[24] VAA2
[▼24]▷Development Drive CL
[0] Zero Cross (-)
[▲5]◁Zero Cross (+)
[0] Lamp Voltage (-)
[0~5]◁Lamp Voltage (+)
[▼24]▷Fusing Lamp 2
[▼24]▷Fusing Lamp 1
[▼24]▷Exposure Lamp
[▼24]▷Main Relay
[24] VAA2
[▼5]◁Original Length 3
[5] VCC
[0] C GND
[▼5]◁Original Length 2
[▼5]◁Original Length 4
[▼5]◁Original Width 5
[▼5]◁Original Width 6
[▼5]◁Original Width 7
[5] VCC
[0] C GND
[0] C GND
[0~5]◁ADS
[5] VCC
[0~5]▷ADS VR
OPERATION PANEL BOARD (PCB7)
CN501
CN123
C GND2
VCC 2
C GND1
VCC1
Data
Latch
Clock
Scan EN
LED EN
CN502-12
CN124-1
Auto Responce Sensor VCC3
Auto Responce Sensor
Auto Responce Sensor C GND
RT 0
RT 1
RT 2
RT 3
RT 4
RT 5
RT 6
RT 7
CN503
S23
VCC3 [5]
Auto Responce Sensor▷[▼5]
C GND3 [0]
Auto Response Sensor
ARDF (option) PYRENEES
CN926
CN110
RxD
TxD
CN921-5
CN921-11
CN305-2
VAA3
A GND
TxD◁
RxD▷
C GND [0]
Erase Lamp L6
CN112
Latch◁[▲5]
Clock◁[▲5]
Data◁[▲5]
VCC [5]
CN122
TD Sensor
S14
TD Sensor Adj◁[0~10]
DC12V
TD Sensor Out▷[0~10]
CN106
Drum Charge Thermister (TH4)
S13
ID Sensor
Drum charge Thermister (+)▷[0~5]
[0] GND
[0] C GND
LED◁[0~5]
VCC [5]
ID Sensor▷[0~5]
SORTER STAPLER (OPTION) MATT20B SEINE
CN130
CN841
M10
Scanner Drive Motor
CN111
CN102
SORTER (OPTION) MINI α
M11
3rd Scanner Drive Motor
M12
Lens Vert… Drive Mot…
COM A (VAA2) [24]
COM B (VAA2) [24]
Sorter Drive Motor◁[▼24]
Cover Open▷[▼24]
Entrance Sensor▷[▼5]
Bin Lift▷[▼5]
Bin H.P.▷[▲5]
Bin Drive Motor Down◁[▼24]
Bin Drive Motor Up◁[▼24]
CN109-9
[24] VAA2
[▼24]▷Junction Gate SOL
SOL 2
Junction Gate SOL (NOTE 2)
CN105-14
(VAA2)
(Charge Roller Position SOL)
S.F.Jogger A▷[▼5]
E.F.Jogger A▷[▼5]
Paper End▷[▲5]
Turn▷[▲5]
Entrance▷[▲5]
S.F.Jogger H.P.▷[▲5]
E.F.Jogger H.P.▷[▲5]
CLK◁[▲5]
CW/CCW◁[▼5]
START/STOP◁[▼5]
POWER DOWN◁[▼5]
Turn Gate SOL◁[▼5]
Duplex Sol▷[▼5]
CN139
CN140
VAA2 [24]
A GND [0]
VCC [5]
C GND [0]
CN481
CN486
CN482
CN480
DUPLEX CONTROL BOARD (PCB9)
CN483
[24] COM A
[▼24]▷A
[24] COM B
[▼24]▷B
M14
Duplex…
CN484
CN488
CN485
M15
End Fence Jogger Motor
M16
Side Fence Jogger Motor
S28
Duplex Paper End Sensor
S29
Duplex Turn Sensor
S30
Duplex Entrance Sensor
S31
Side Fence Jogger H.P.Sensor
S32
End Fence Jogger H.P.Sensor
Duplex Tray (NOTE 2)

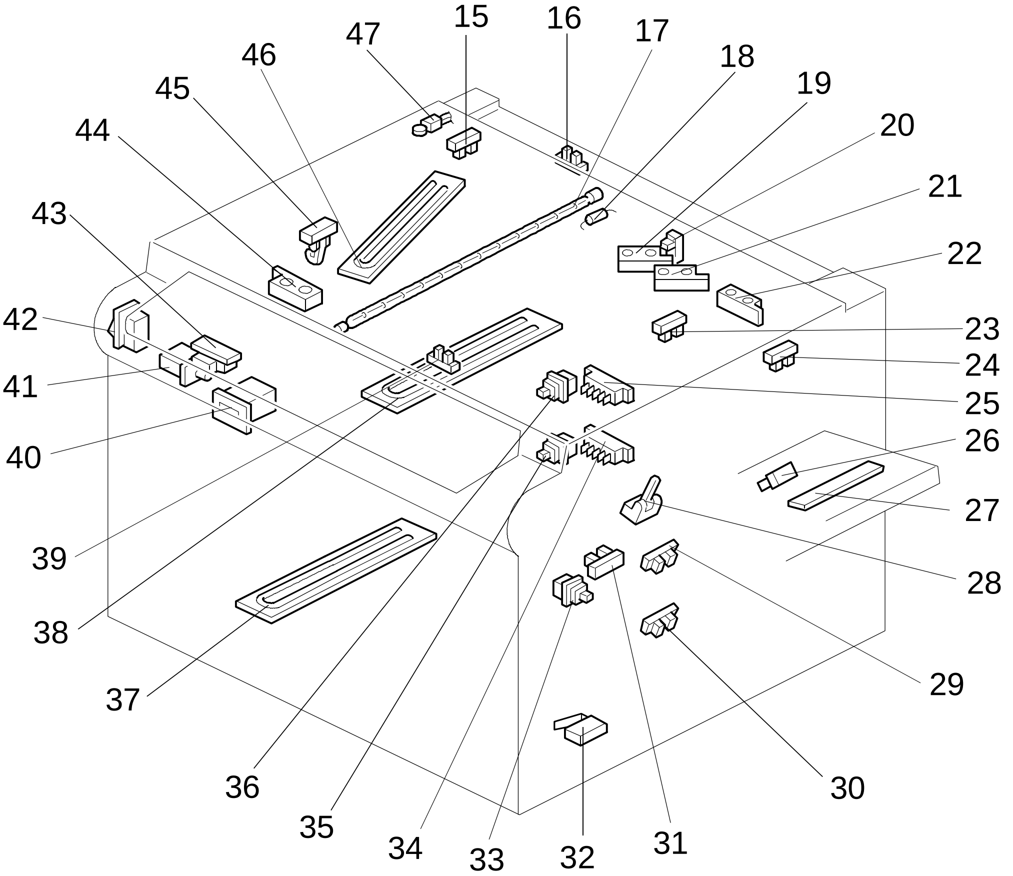
5. EXCEPT LCT MACHINES
4. FOR LCT MACHINES, FUNCTIONS ARE CHANGED AS FOLLOWS:
By-Pass Feed Pick Up SOL → LCT Pick Up SOL,
LCT Pick Up SOL → By-Pass Feed Pick Up SOL
3. ONLY FOR LCT MACHINES
2. ONLY FOR DUPLEX MACHINES
(NOTE) 1. EXCEPT DUPLEX MACHINES

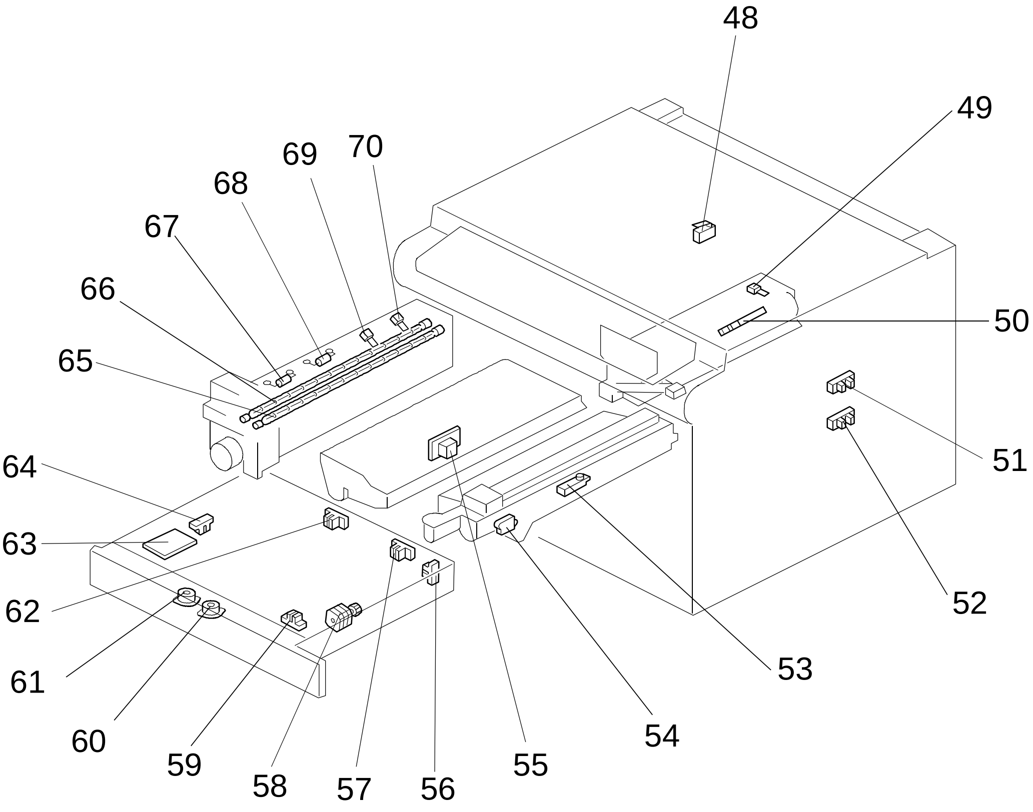

9
10
11
12
13
14
15
16
CHOKE COIL (CC1)
DC POWER SUPPLY BOARD (PCB3)
Cover Safety SW (SW11)
MAIN MOTOR CONTROL BOARD (PCB4)
M1
MAIN MOTOR
Drum Charge Roller
Drum
Transfer Belt
Development Roller
HIGH VOLTAGE SUPPLY BOARD CB (PCB5)
CN861
VAA2
A GND
VCC
C GND
Charge FB
Charge PWM
Dev BIAS FB
Dev BIAS PWM
HIGH VOLTAGE SUPPLY BOARD-T (PCB6)
CN865
Transfer Current
Transfer PWM
Transfer Voltage
VCC (Paper Tray Unit/Sorter/Duplex/LCT)
C GND (Paper Tray Unit/Sorter/Duplex)
VAA2 (Paper Tray Unit/Duplex/LCT)
A GND (Paper Tray Unit/Duplex/LCT)
VAA3 (Sorter)
A GND (Sorter)
VAA3 (ARDF)
A GND (ARDF)
Transfer Belt Contact CL
Secondary Fusing Thermistor (TH2)
Main Fusing Thermistor (TH1)
Key Counter
Total Counter
Original Length Sensor (Option)
Transfer Belt Contact H.P. Sensor
Toner End Sensor
Platen Cover Sensor
PTL
Fusing Exit Sensor
Original Length Sensor-2
QL
CO2
CO1
S33
CL3
S24
S22
S21
L4
S20
S19
L5
Upper Paper Feed CL (NOTE 1) (SMC)
CL7
Lower Paper Feed CL (SMC)
CL8
M13
Lens Horizontal Drive Motor
S18
3rd Scanner H.P.Sensor
SW2
Upper Tray SW (NOTE 1)
SW3
Lower Tray SW
MAIN CONTROL BOARD (PCB1)
Scanner H.P. Sensor
S17
Lens Vertical H.P.Sensor
S16
Lens Horizontal H.P.Sensor
S15
Registration Sensor
S12
By-Pass Feed Paper End Sensor
S2
By-Pass Feed Table SW
SW1
By-Pass Pick Up SOL (NOTE 4)
SOL 1
Registration CL
CL4
By-pass Feed CL
CL5
Upper Tray Paper Size SW (NOTE 1)
SW5
Lower Tray Paper Size SW
SW6
Upper Tray Paper End Sensor (NOTE 1)
S3
Upper Relay Sensor
S4
Lower Tray Paper End Sensor
S6
Lower Relay Sensor
S7
By-Pass Feed Paper Size Sensor
S1
Vertical Guide Set SW (SW7) (NOTE 5)
Relay CL (SMC)
CL6
LCT Cover SW-1 (SW8)
S9
LCT Lower Limit Sensor
SW4
Tray Down SW
S10
LCT Paper End Sensor
S11
LCT Paper Limit Sensor
SOL 3
LCT Pick Up SOL
Paper Tray Unit (option)
CN721-5
CN806-24
LCT Interface Board (PCB11)
LCT Cover SW-2 (SW9)
LCT Lift Motor
M5
LCT (NOTE 3)

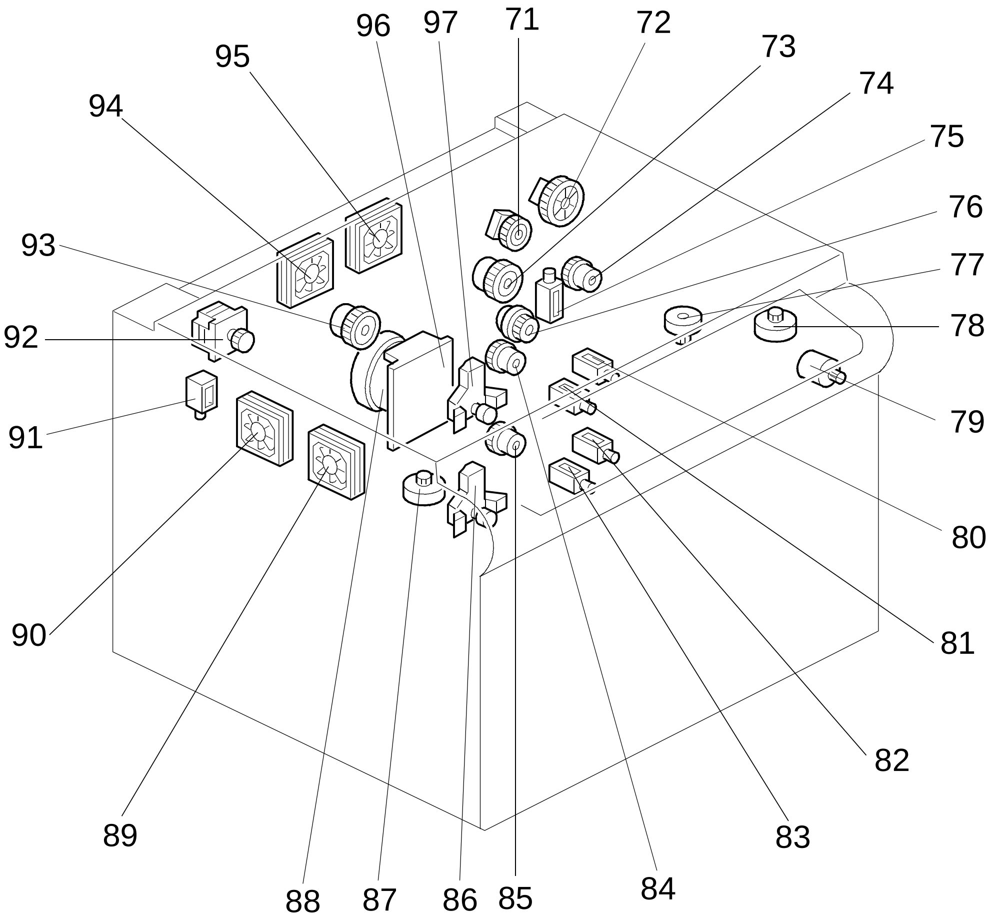
POINT TO POINT DIAGRAM A157/A159/A160 MACHINES

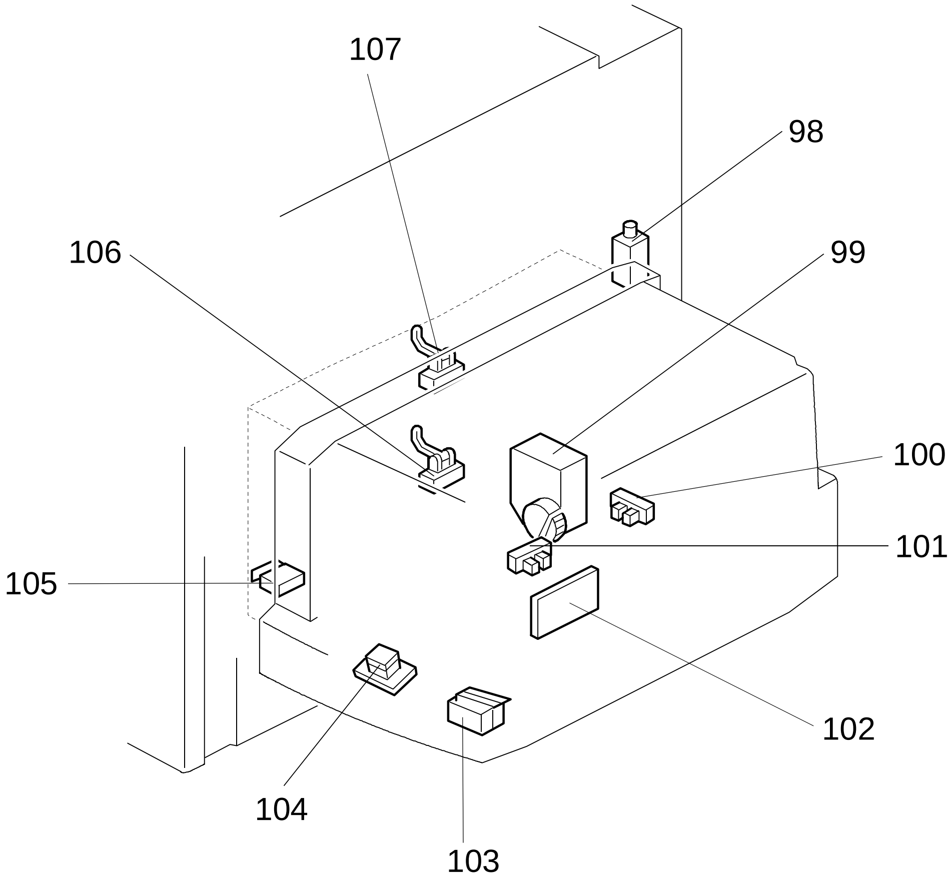
COPIER ELECTRICAL COMPONENT LAYOUT


1
14
2
13
12
3
11
10
4
9
5
8
7
6









Description	Index No.	**P to P Location**
CB High Voltage Supply Board (PCB5)	1	A2
Erase Lamp (L6)	2	H2
Operation Panel Board (PCB7)	3	F2
Pre-transfer Lamp (L4)	4	D13
Quenching Lamp (L5)	5	D14
Liquid Crystal Display Board (A156 machines only) (PCB10)	6	E2
Transformer (220 ~ 240V machines only) (TR1)	7	C3
Nose Filter Board (220 ~ 240V machines only) (PCB8)	8	A2
Circuit Breaker (220 ~ 240V machines only) (CB1)	9	A2
Choke Coil (CC1)	10	B9
DC Power Supply Board (PCB3)	11	C9
AC Drive Board (PCB2)	12	C6
Auto Image Density Sensor (ADS Sensor) (S25)	13	D8
Main Control Board (PCB1)	14	F13
Scanner HP Sensor (S17)	15	G10
Platen Cover Sensor (S21)	16	D13
Exposure Lamp (L1)	17	A6
Exposure Lamp Thermofuse (TF3)	18	A6
Original Length Sensor-1 (S27)	19	D7
Lens Vertical HP Sensor (S16)	20	G10
Original Length Sensor-2 (S19)	21	D14
Original Length Sensor (Option for N. American models (S33)	22	D11
Transfer Belt Contact HP Sensor (S24)	23	D12
3rd Scanner HP Sensor (S18)	24	F9
Upper Tray Paper Size Switch (Non-duplex machines only) (SW5)	25	G16
LCT Upper Limit Sensor (LCT machines only) (S11)	26	J13
By-pass Feed Paper Width Sensor (S1)	27	J16
Registration Sensor (S12)	28	H10

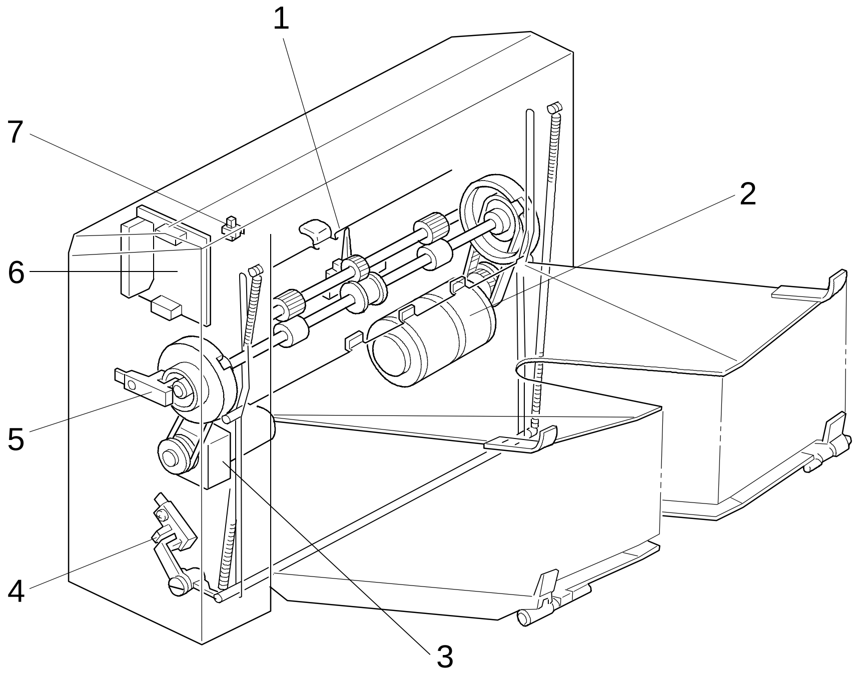
Description	Index No.	**P to P Location**
Upper Tray Upper Limit Sensor (A153/A155 machines only) (S5)	29	I16
Lower Tray Upper Limit Sensor (A153/A155/A156 machines only) (S8)	30	J16
By-pass Feed Paper End Sensor (S2)	31	H10
Vertical Guide Set Switch (Non-LCT machines only) (SW7)	32	J16
By-pass Feed Table Switch (SW1)	33	I10
Lower Tray Paper Size Switch (SW6)	34	H16
Lower Tray Switch (SW3)	35	G11
Upper Tray Switch (Non-duplex machines only) (SW2)	36	G11
Lower Tray Heater (option) (H3)	37	A5
Drum Heater (H1)	38	A4
Lens Horizontal HP Sensor (S15)	39	G10
Total Counter (CO1)	40	D11
Front Cover Safety Switch (SW11)	41	C10
Main Switch (SW10)	42	B8
Auto Response Sensor (S23)	43	F1
Original Width Sensor (S26)	44	D8
Fusing Exit Sensor (S20)	45	D14
Optics Anti-condensation Heater (option) (H2)	46	A5
Optics Thermistor (TH3)	47	D4

Description	Index No.	P to P Location
Exit Cover Safety Switch (A157/A159/A160 machines only) (SW12)	48	D10
Drum Charge Thermistor (TH4)	49	I2
Image Density Sensor (ID) (S13)	50	I3
Upper Tray Paper End Sensor (Non-duplex machines only) (S3)	51	H16
Lower Tray Paper End Sensor (S6)	52	I16
Toner Density Sensor (TD) (S14)	53	I3
Toner End Sensor (S22)	54	D13
T High Voltage Supply Board (PCB6)	55	B12
Duplex Paper End Sensor (Duplex machines only) (S28)	56	K5
Duplex Turn Sensor (Duplex machines only) (S29)	57	K5
Duplex Feed Motor (Duplex machines only) (M14)	58	J8
Side Fence Jogger HP Sensor (Duplex machines only) (S31)	59	K6
Side Fence Jogger Motor (Duplex machines only) (M16)	60	K5
End Fence Jogger Motor (Duplex machines only) (M15)	61	K4
Duplex Entrance Sensor (Duplex machines only) (S30)	62	K6
Duplex Control Board (Duplex machines only) (PCB9)	63	J5
End Fence Jogger HP Sensor (Duplex machines only) (S32)	64	K6
Main Fusing Lamp (L2)	65	A7
Secondary Fusing Lamp (L3)	66	A8
Secondary Fusing Thermofuse (TF2)	67	B7
Main Fusing Thermofuse (TF1)	68	A7
Main Fusing Thermistor (TH1)	69	D12
Secondary Fusing Thermistor (TH2)	70	C12
Development Clutch (CL2)	71	D6
Toner Supply Clutch (CL1)	72	D5
Registration Clutch (CL4)	73	I10
By-pass Feed Clutch (CL5)	74	I10

Description	Index No.	P to P Location
LCT machines: LCT/By-Pass Pick up Solenoid Non-LCT machines: By-Pass Pick up Solenoid (SOL1)	75	I10
Relay Clutch (CL6)	76	K16
Lens Horizontal Drive Motor (M13)	77	G9
3rd Scanner Drive Motor (M11)	78	G8
Toner Bottle Drive Motor (M2)	79	D6
Upper Tray Pick-up Solenoid (A153/A155 machines only) (SOL4)	80	E16
Upper Tray Separation Solenoid (A153/A155 machines only) (SOL6)	81	F16
Lower Tray Pick-up Solenoid (A153/A155/A156 machines only) (SOL5)	82	F16
Lower Tray Separation Solenoid (A153/A155/A156 machines only) (SOL7)	83	F16
Upper- Paper Feed Clutch (Non-duplex machines only) (CL7)	84	E16
Lower Paper Feed Clutch (CL8)	85	E16
Lower Tray Lift Motor (A153/A155/A156 machines only) (M4)	86	G16
Lens Vertical Drive Motor (M12)	87	G8
Main Motor (M1)	88	D10
Exhaust Fan Motor 1 (M8)	89	D5
Exhaust Fan Motor 2 (A153/A155/A156 machines only) (M9)	90	D5
Junction Gate Solenoid (Duplex machines only) (SOL2)	91	G7
Scanner Drive Motor (M10)	92	F7
Transfer Belt Contact Clutch (CL3)	93	D11
Optics Cooling Fan Motor 1 (M6)	94	D4
Optics Cooling Fan Motor 2 (A153/A155/A156 machines only) (M7)	95	D5
Main Motor Control Board (PCB4)	96	D9
Upper Tray Lift Motor (A153/A155 machines only) (M3)	97	F16

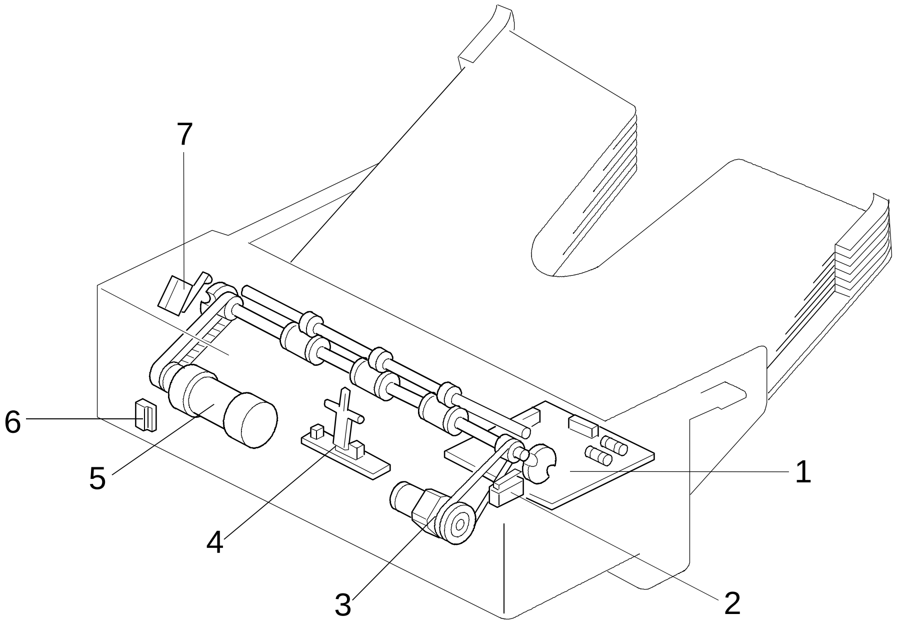
Description	**Index No.**	**P to P Location**
LCT Pick-up Solenoid (LCT machines only) (SOL3)	98	J14
LCT Lift Motor (LCT machines only) (M5)	99	L11
LCT Lower Limit Sensor (LCT machines only) (S9)	100	J12
LCT Paper End Sensor (LCT machines only) (S10)	101	J13
LCT Interface Board (LCT machines only) (PCB11)	102	K12
LCT Cover Switch-2 (LCT machines only) (SW9)	103	K12
Tray Down Switch (LCT machines only) (SW4)	104	J13
LCT Cover Switch-1 (LCT machines only) (SW8)	105	J12
Lower Relay Sensor (S7)	106	I16
Upper Relay Sensor (S4)	107	H16

20 BIN SORTER (A556) ELECTRICAL COMPONENT LAYOUT



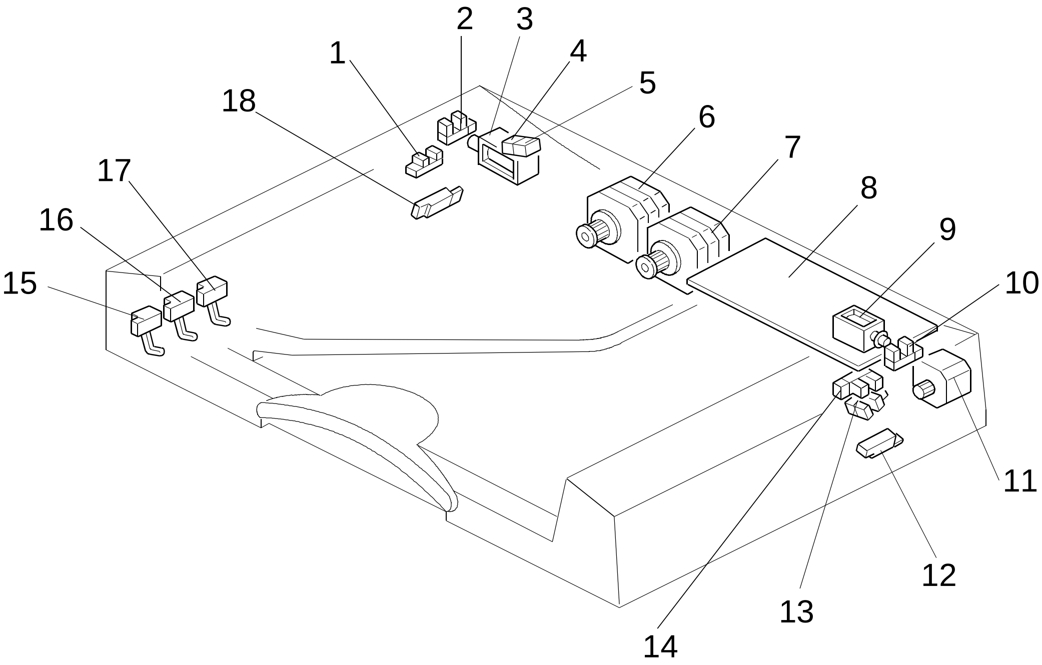
Description	Index No.	P to P Location
Paper Sensor (S1)	1	G15
Wheel Drive Motor (M1)	2	C15
Roller Drive Motor (M2)	3	E15
Bin Home Position Sensor (S2)	4	I15
Wheel Sensor (S3)	5	H15
Sorter Control Board (PCB1)	6	F8
Cover Safety Switch (SW1)	7	J15

10 BIN SORTER (A557) ELECTRICAL COMPONENT LAYOUT



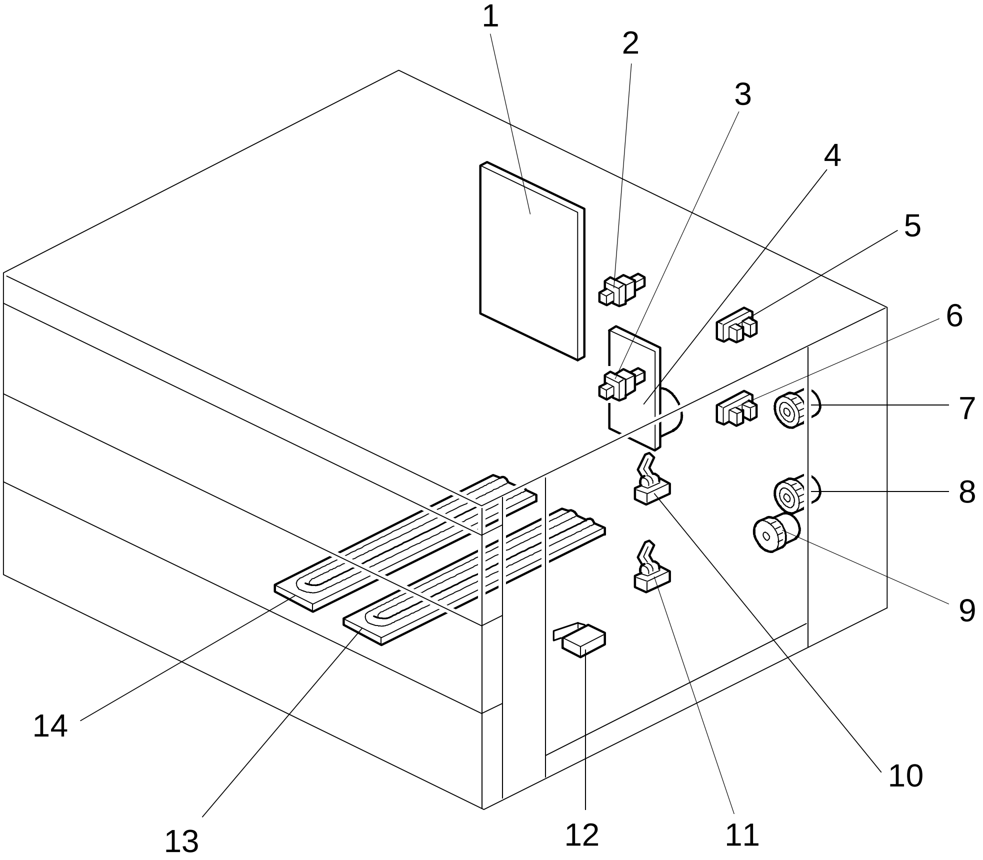
Description	Index No.	P to P Location
Sorter Main Board (PCB1)	1	F8
Wheel Switch (SW1)	2	H14
Roller Drive Motor (M1)	3	E14
Paper Sensor (S1)	4	J14
Bin Drive Motor (M2)	5	C14
Sorter Switch (SW2)	6	I14
Home Position Switch (SW3)	7	G14

ARDF (A548) ELECTRICAL COMPONENT LAYOUT



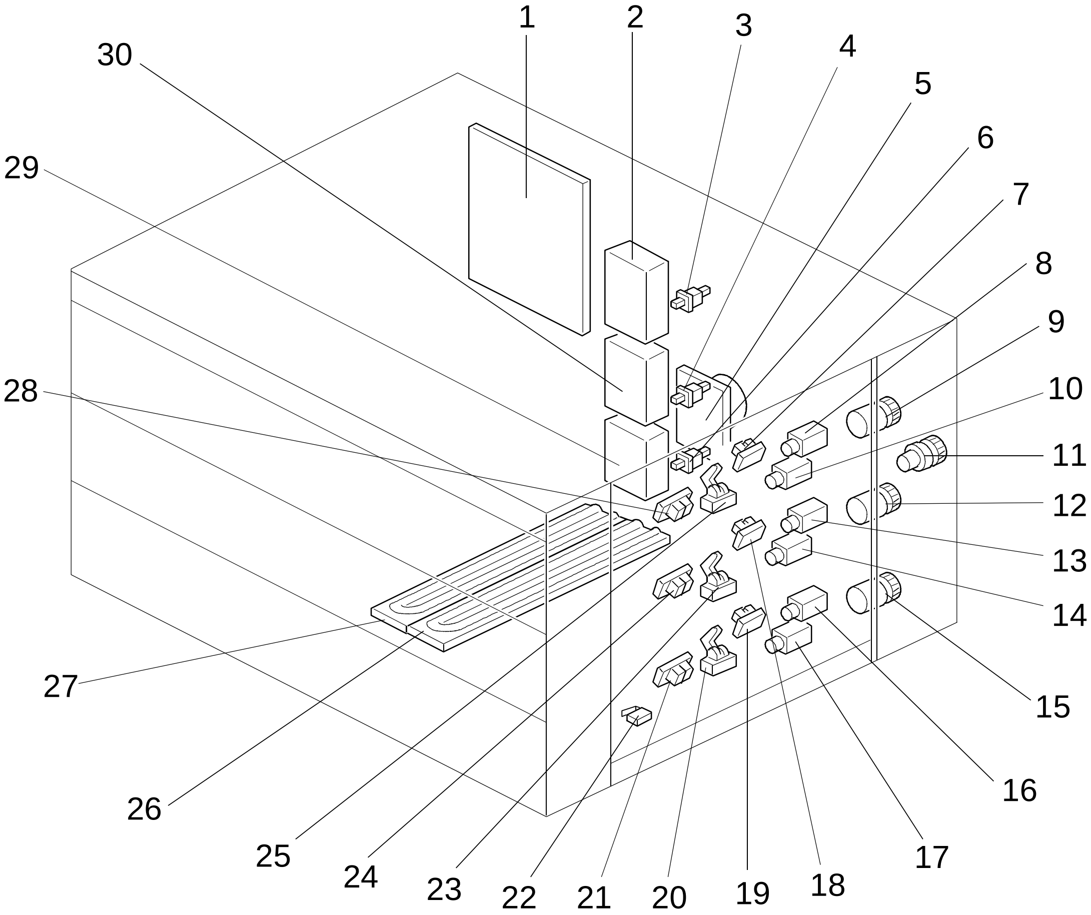
Description	Index No.	P to P Location
Original Set Sensor (S1)	1	B3
Feed-in Cover Open Sensor (S2)	2	E3
Stopper Solenoid (SOL1)	3	I16
Ready Lamp (L1)	4	D3
Auto Lamp (L2)	5	C3
Feed-in Motor (M1)	6	C16
Belt Drive Motor (M2)	7	E16
DF Main Board (PCB1)	8	F11
Inverter Solenoid (SOL2)	9	J16
Feed-out Cover Open Sensor (S3)	10	J3
Feed-out Motor (M3)	11	F16
Feed-out Sensor (S4)	12	I3
APS Start Sensor (S5)	13	L3
DF Position Sensor (S6)	14	K3
Original Width Sensor-1 (S7)	15	H3
Original Width Sensor-2 (S8)	16	G3
Original Width Sensor-3 (S9)	17	F3
Registration Sensor (S10)	18	A3

PAPER TRAY UNIT (A553) ELECTRICAL COMPONENT LAYOUT


1
2
3
4
5
6
7
8
9
10
11
12
13
14

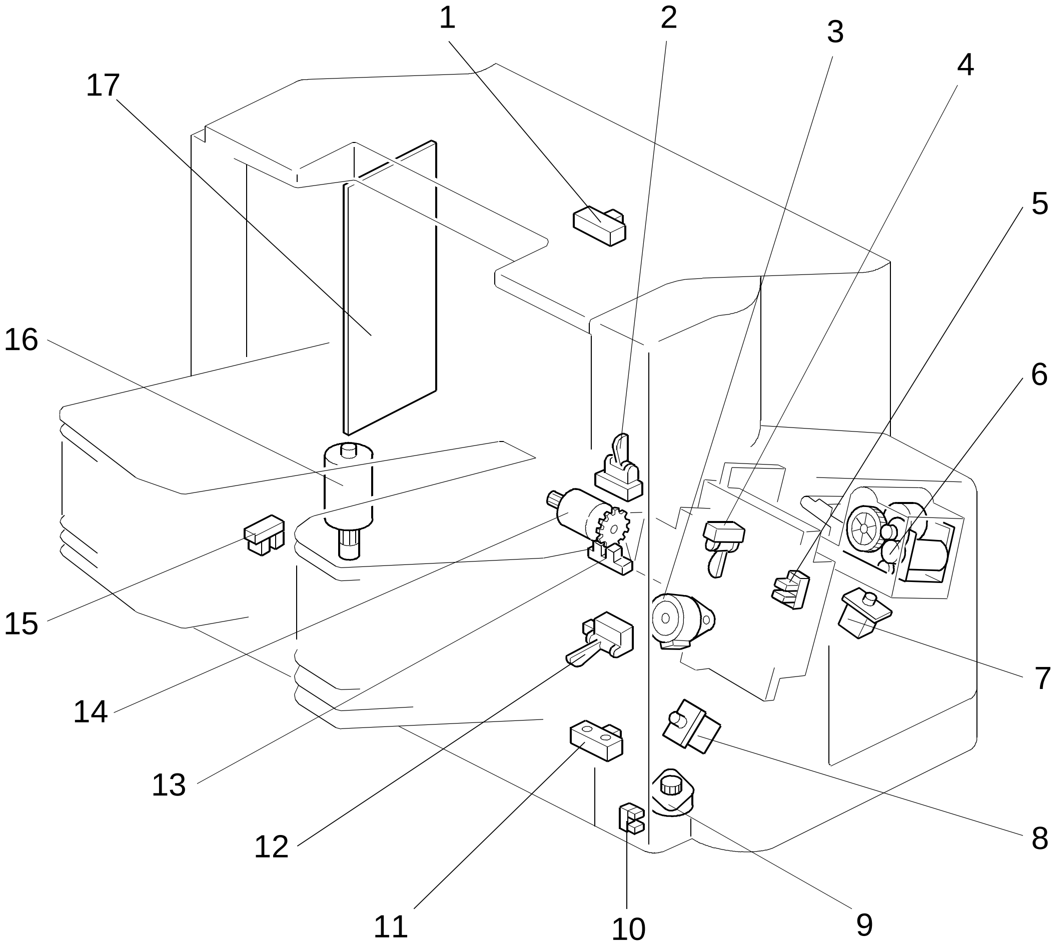
Description	Index No.	P to P Location
Interface Board (PCB1)	1	F8
Tray Set Switch 1 (SW2)	2	H2
Tray Set Switch 2 (SW3)	3	I2
Main Motor (M1)	4	G2
Paper End Sensor 1 (S3)	5	G16
Paper End Sensor 2 (S4)	6	G16
Paper Feed Clutch 1 (CL1)	7	I16
Paper Feed Clutch 2 (CL2)	8	I16
Relay Clutch (CL3)	9	H16
Relay Sensor 1 (S1)	10	B16
Relay Sensor 2 (S2)	11	C16
Tray Cover Switch (SW1)	12	B16
Tray Heater (Option) (H1)	13	C6
Tray Heater (Option) (H2)	14	D6

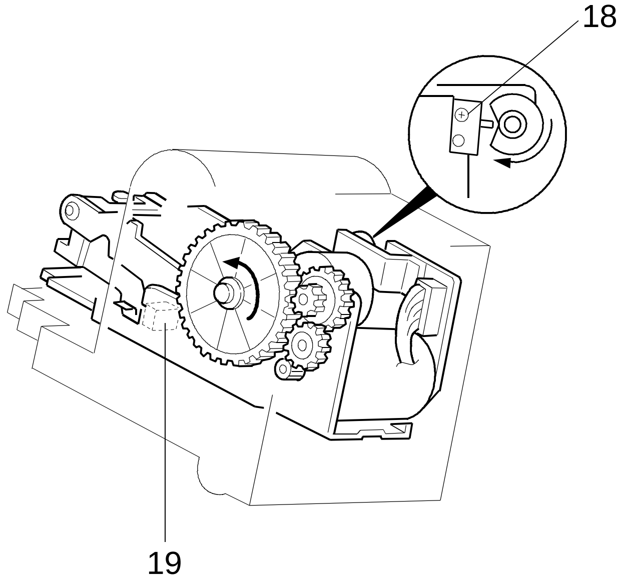
PAPER TRAY UNIT (A549/A550) ELECTRICAL COMPONENT LAYOUT


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30

Description	Index No.	P to P Location
Interface Board (PCB1)	1	F8
Tray Lift Motor 1 (M2)	2	E2
Tray Set Switch 1 (SW2)	3	H2
Tray Set Switch 2 (SW3)	4	H2
Main Motor (M1)	5	F2
Tray Set Switch 3 (A549 only) (SW4)	6	I2
Tray Upper Limit Sensor 1 (S1)	7	E16
Paper Pick-up Solenoid 1 (SOL1)	8	D16
Paper Feed Clutch 1 (CL1)	9	K16
Separation Solenoid 1 (SOL4)	10	E16
Relay Clutch (CL4)	11	J16
Paper Feed Clutch 2 (CL2)	12	K16
Paper Pick-up Solenoid 2 (SOL2)	13	F16
Separation Solenoid 2 (SOL5)	14	G16
Paper Feed Clutch 3 (A549 only) (CL3)	15	L16
Paper Pick-up Solenoid 3 (A549 only) (SOL3)	16	I16
Separation Solenoid 3 (A549 only) (SOL6)	17	J16
Tray upper Limit Sensor 2 (S2)	18	G16
Tray upper Limit Sensor 3 (A549 only) (S3)	19	I16
Relay Sensor 3 (A549 only) (S6)	20	C16
Paper End Sensor 3 (A549 only) (S9)	21	H16
Tray Cover Switch (SW1)	22	A16
Relay Sensor 2 (S5)	23	B16
Paper End Sensor 2 (S8)	24	F16
Relay Sensor 1 (S4)	25	B16
Tray Heater (Option) (H1)	26	B6
Tray Heater (Option) (H2)	27	C6
Paper End Sensor 1 (S7)	28	C16
Tray Lift Motor 3 (A549 only) (M4)	29	F2
Tray Lift Motor 2 (M3)	30	E2

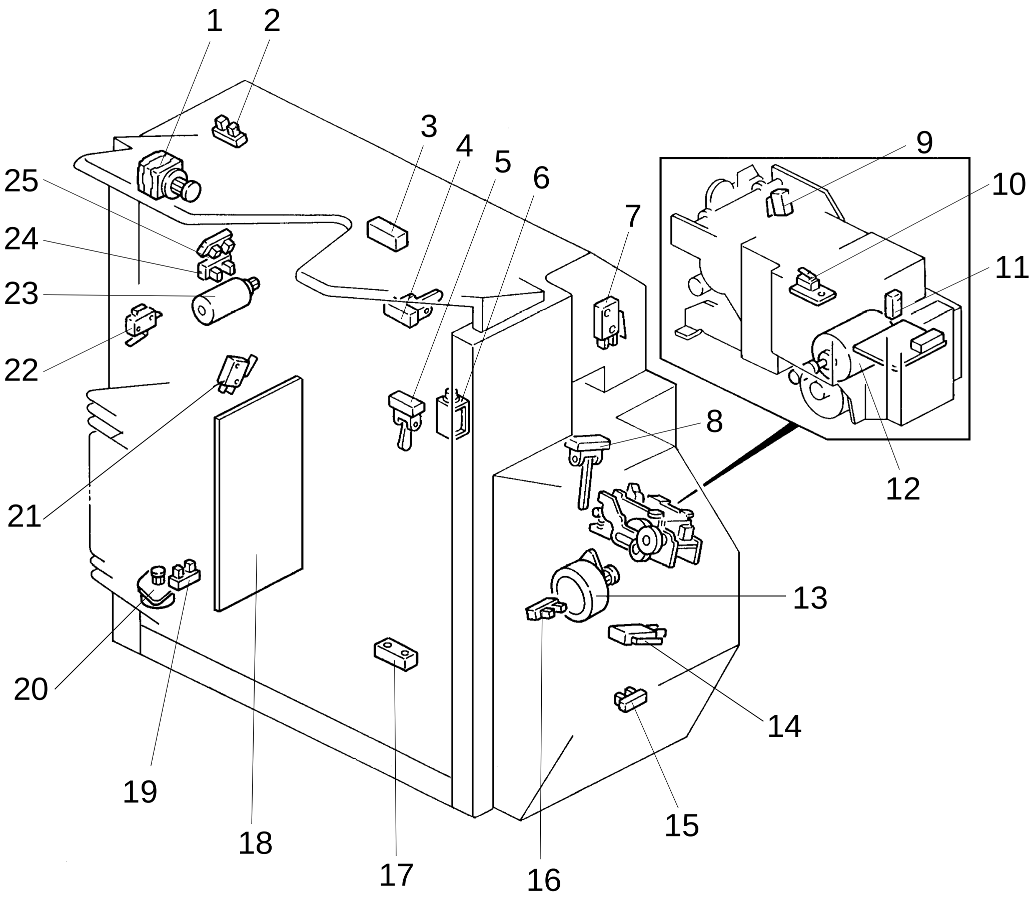
10 BIN SORTER STAPLER (A555) ELECTRICAL COMPNENT LAYOUT


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17



Description	Index No.	P to P Location
Bin Sensor (Photo tr.) (S1)	1	I15
Sorter Entrance Sensor (S2)	2	F15
Grip Motor (M5)	3	I2
Stapler Paper Sensor (S5)	4	A15
Grip H.P. Sensor (S6)	5	B15
Stapler Motor (M4)	6	E1
Stapler Switch (SW2)	7	F5
Door Safety Switch (SW1)	8	C5
Jogger Motor (M2)	9	H2
Wheel Sensor (S8)	10	C15
Bin Sensor (LED) (S7)	11	K15
Bin H.P. Sensor (S9)	12	H15
Timing Sensor (S4)	13	G15
Transport Motor (M1)	14	E16
Jogger H.P. Sensor (S3)	15	J15
Bin Drive Motor (M3)	16	K2
Main Board (PCB1)	17	F8
Staple H.P. Sensor (S10)	18	E1
Staple End Sensor (S11)	19	E1

20 BIN SORTER STAPLER (A554) ELECTRICAL COMPONENT LAYOUT


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

Description	Index No.	P to P Location
Roller Drive Motor (M5)	1	B2
Roller Drive Timing Sensor (S11)	2	C3
Bin Sensor (LED) (S5)	3	J16
Proof Tray Exit Sensor (S10)	4	D3
Bin Exit Sensor (S9)	5	D3
Turn Gate Solenoid (SOL1)	6	E3
Sorter Stapler Set Switch (SW4)	7	L4
Paper Sensor (S4)	8	I16
Staple Guide Switch (SW6)	9	G2
Staple End Switch (SW5)	10	G2
Staple H.P. Switch (SW7)	11	G2
Stapler Motor (M4)	12	F3
Grip Motor (M3)	13	I2
Front Door Switch (SW3)	14	L5
Bin H.P. Sensor (S8)	15	H3
Grip H.P. Sensor (S7)	16	J3
Bin Sensor (Photo tr.) (S6)	17	K16
Main Control Board (PCB1)	18	F9
Jogger H.P. Sensor (S3)	19	E16
Jogger Motor (M2)	20	G16
Wire Tension Switch (SW2)	21	B16
Upper Lift Limit Switch (SW1)	22	B16
Bin Lift Motor (M1)	23	A16
Bin Lift Timing -1 Sensor (S1)	24	C16
Bin Lift Timing -2 Sensor (S2)	25	D16

Swallow 2 (A212/A214)

PARTS CATALOG

First Edition October 1997

RICOH COMPANY,LTD

PARTS CATALOG

INTRODUCTION

This chapter instructs you the numbers and names of parts on this machine.

INDEX to PARTS CATALOG

Swallow 2 (A212/A214)

Swallow 2 (A212/A214)

PARTS CATALOG

INTRODUCTION

This chapter instructs you the numbers and names of parts on this machine.

INDEX to PARTS CATALOG

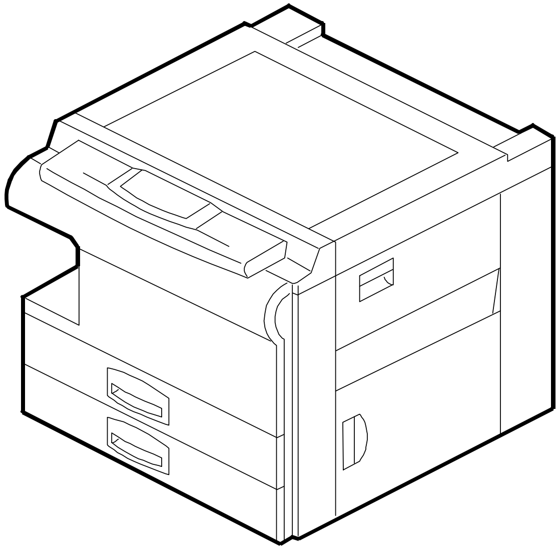
LOCATION OF UNIT 2
1.EXTERIOR (A212/A214) 8
2.PLATEN COVER ASS'Y (A212/A214) 10
3.OPERATION PANEL UNIT (A212/A214) 12
4.BY-PASS FEED SECTION (A212/A214) 14
5.PAPER TRAY SECTION (A212/A214) 16
6.LCT UNIT 1 (A214) 18
7.LCT UNIT 2 (A214) 20
8.PAPER FEED SECTION 1 (A212/A214) 22
9.PAPER FEED SECTION 2 (A212/A214) 24
10.PAPER REGISTRATION (A212/A214) 26
11.OPTICAL SECTION 1 (A212/A214) 28
12.OPTICAL SECTION 2 (A212/A214) 30
13.OPTICAL SECTION 3 (A212/A214) 32
14.OPTICAL SECTION 4 (A212/A214) 34
15.TONER SUPPLY UNIT (A212/A214) 36
16.DEVELOPMENT UNIT (A212/A214) 38
17.DRUM UNIT 1 (A212/A214) 40
18.DRUM UNIT 2 (A212/A214) 42
19.TRANSFER UNIT (A212/A214) 44
20.FUSING UNIT 1 (A212/A214) 46
21.FUSING UNIT 2 (A212/A214) 48
22.DUPLEX TRAY 1 (A214) 50
23.DUPLEX TRAY 2 (A214) 52
24.DUPLEX TRAY 3 (A214) 54
25.DUPLEX TRAY 4 (A214) 56
26.PAPER EXIT SECTION (A214) 58
27.PAPER EXIT SECTION (A212) 60
28.DRIVE SECTION 1 (A212/A214) 62
29.DRIVE SECTION 2 (A212/A214) 64
30.DRIVE SECTION 3 (A212/A214) 66
31.ELECTRICAL SECTION 1 (A212/A214) 68
32.ELECTRICAL SECTION 2 (A212/A214) 70
33.ELECTRICAL SECTION 3 (A212/A214) 72
34.FRAME SECTION 1 (A212/A214) 74
35.FRAME SECTION 2 (A212/A214) 76
36.MAIN CONTROL BOARD (A212/A214) 78
37.DECAL AND DOCUMENT (A212/A214) 84

October ,30 '97

38.SPECIAL TOOLS (A212/A214).. 86
PARTS INDEX 89

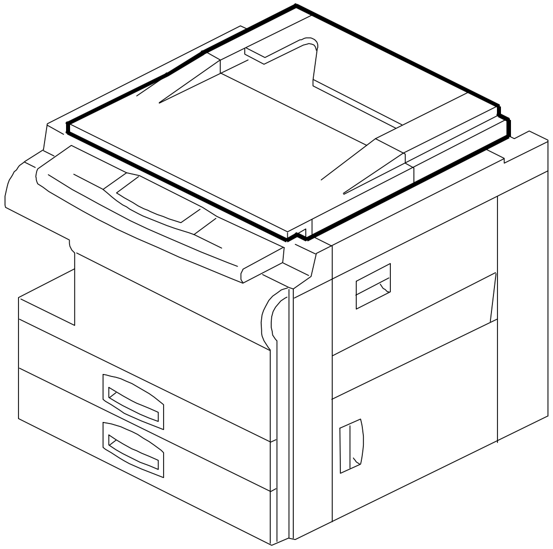
LOCATION OF UNIT

1.EXTERIOR (A212/A214)



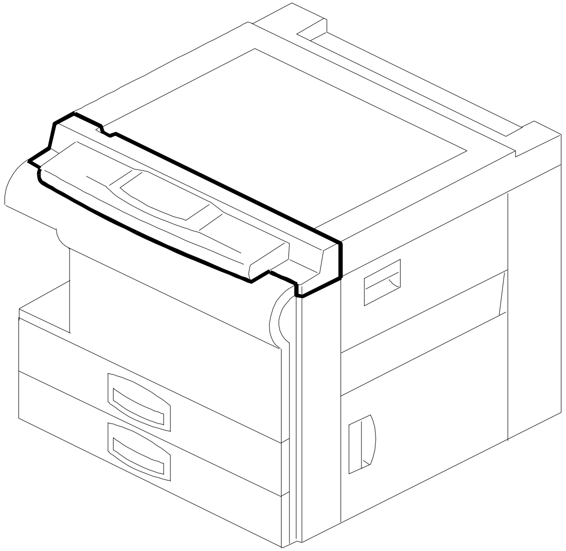
See Page 9

2.PLATEN COVER ASS'Y (A212/A214)



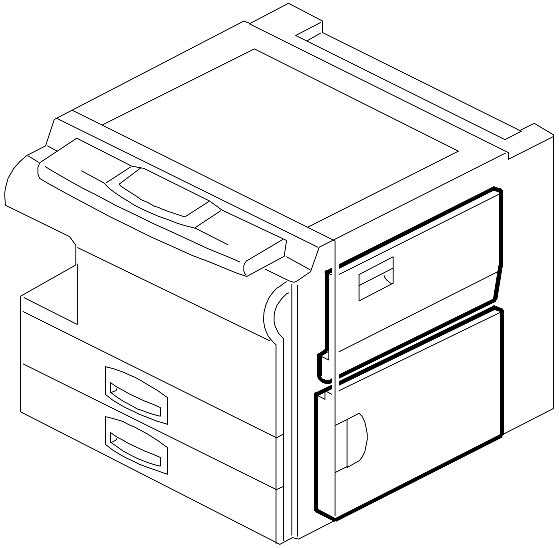
See Page 11

3.OPERATION PANEL UNIT (A212/A214)



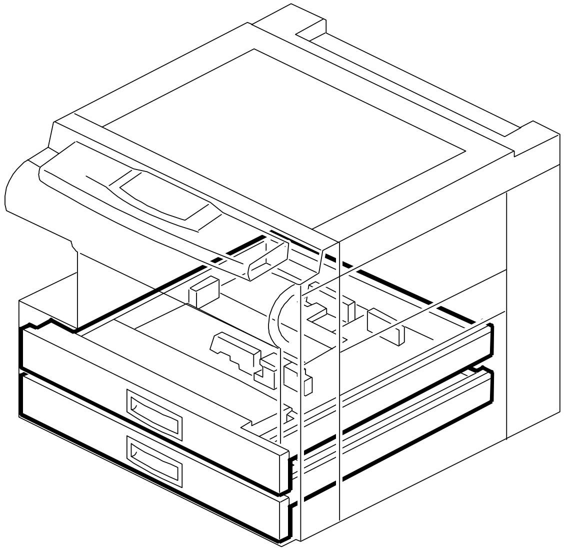
See Page 13

4.BY-PASS FEED SECTION (A212/A214)



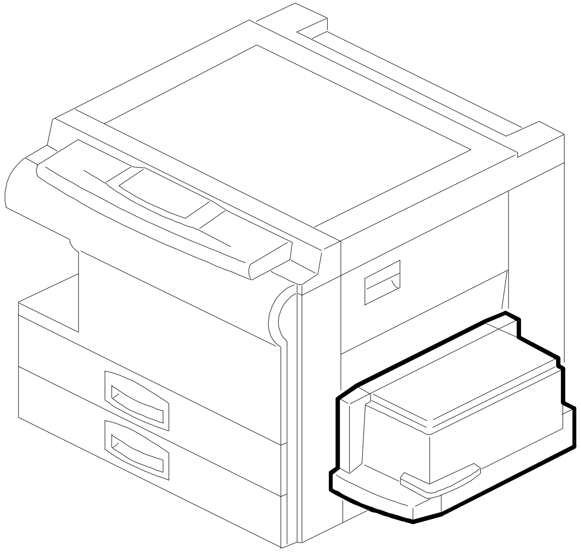
See Page 15

5.PAPER TRAY SECTION (A212/A214)



See Page 17

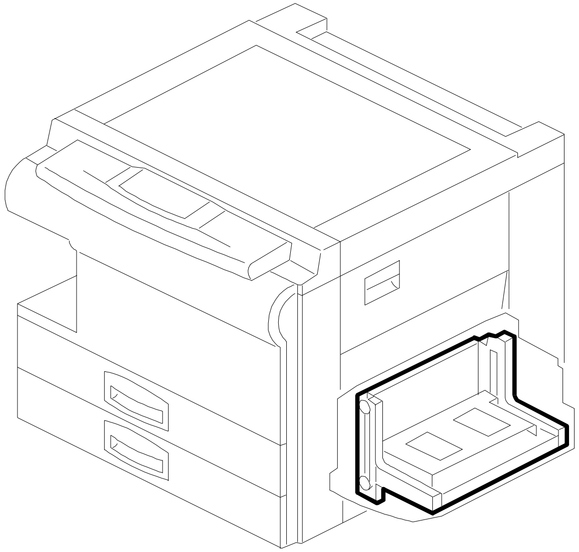
6.LCT UNIT 1 (A214)



See Page 19

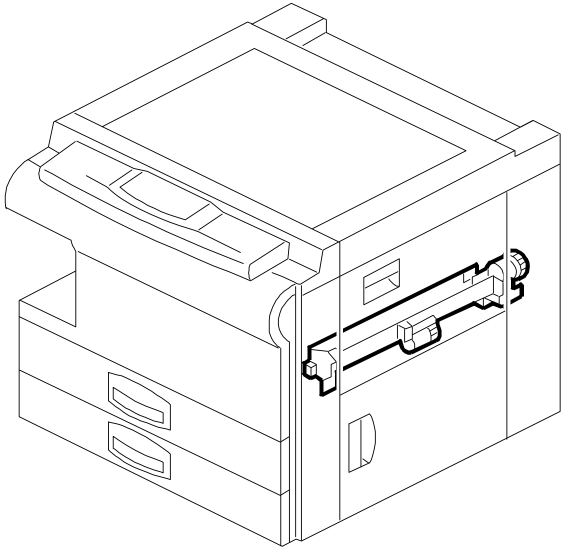
LOCATION OF UNIT

7.LCT UNIT 2 (A214)



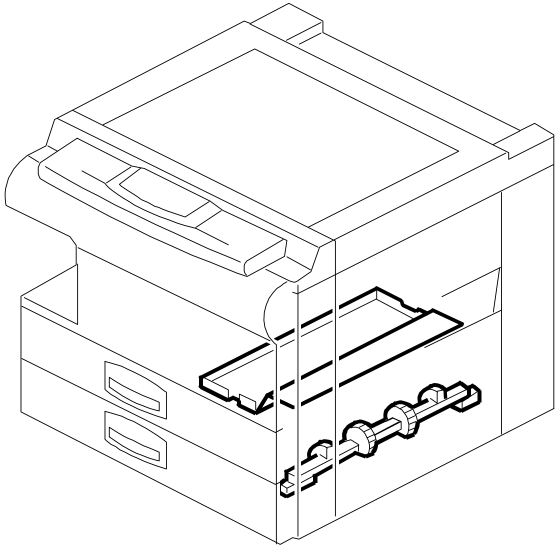
See Page 21

8.PAPER FEED SECTION 1 (A212/A214)



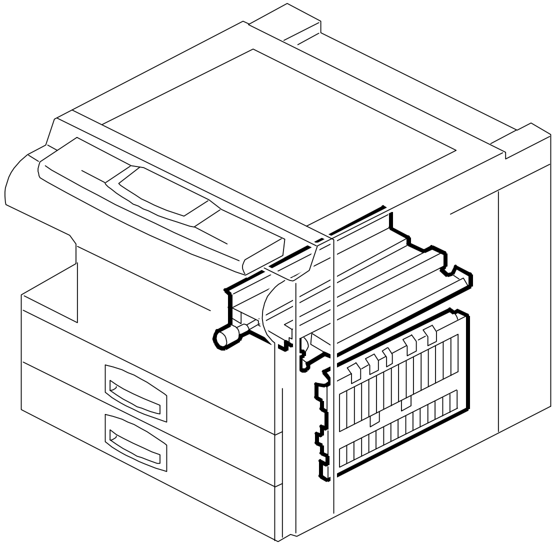
See Page 23

9.PAPER FEED SECTION 2 (A212/A214)



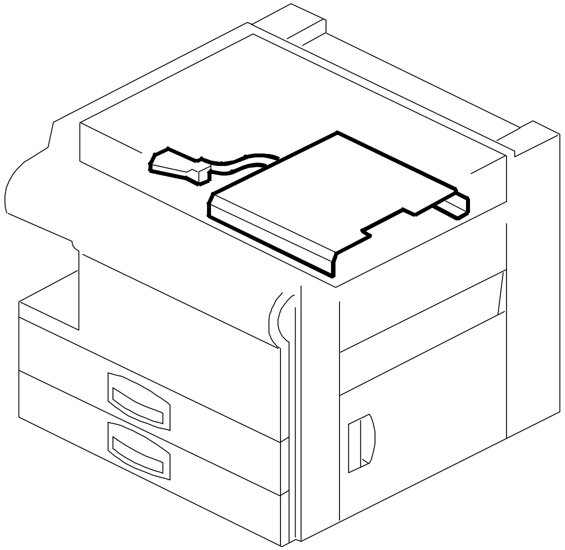
See Page 25

10.PAPER REGISTRATION (A212/A214)



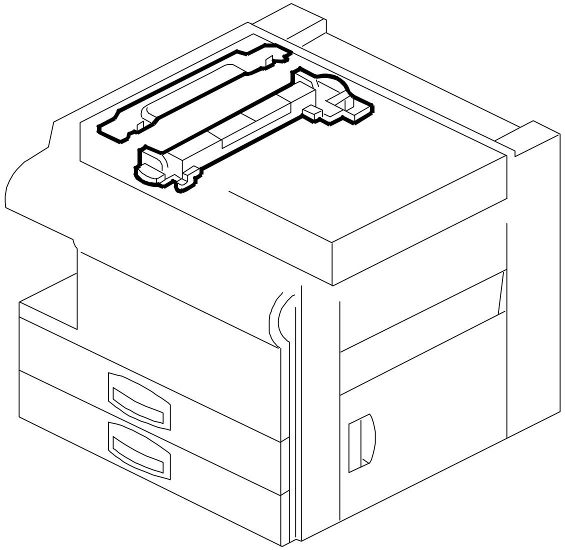
See Page 27

11.OPTICAL SECTION 1 (A212/A214)



See Page 29

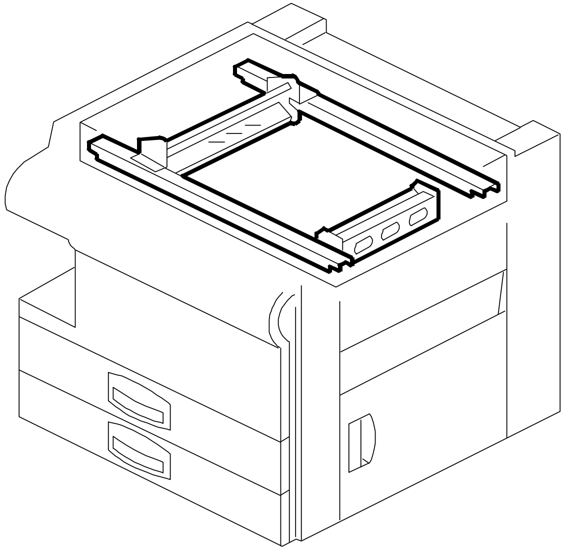
12.OPTICAL SECTION 2 (A212/A214)



See Page 31

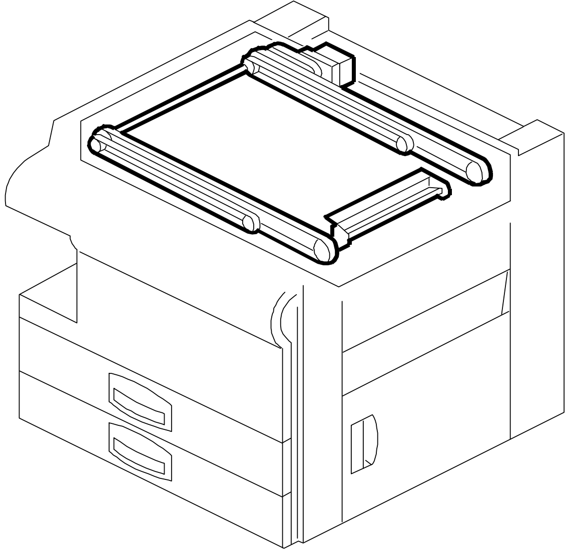
LOCATION OF UNIT

13.OPTICAL SECTION 3 (A212/A214)



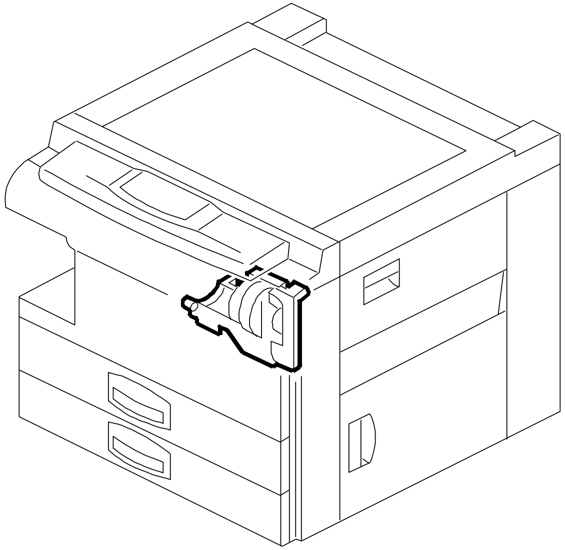
See Page 33

14.OPTICAL SECTION 4 (A212/A214)



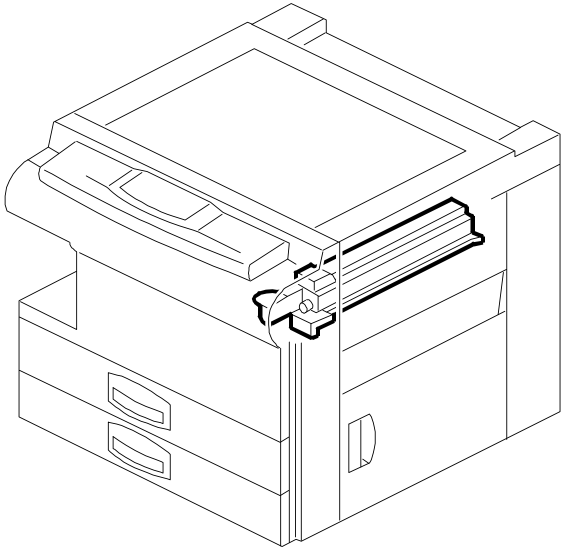
See Page 35

15.TONER SUPPLY UNIT (A212/A214)



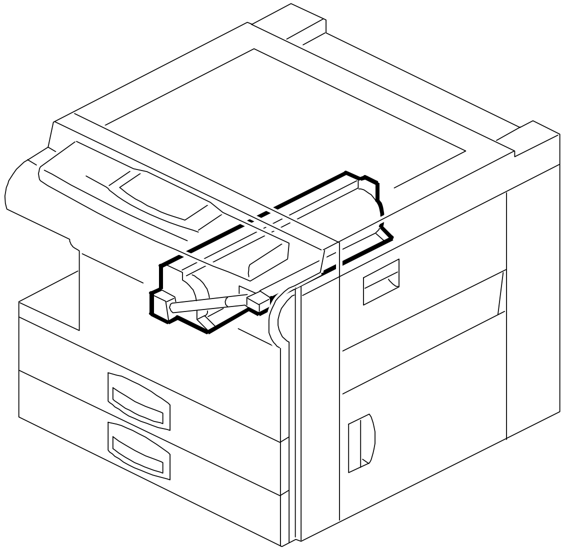
See Page 37

16.DEVELOPMENT UNIT (A212/A214)



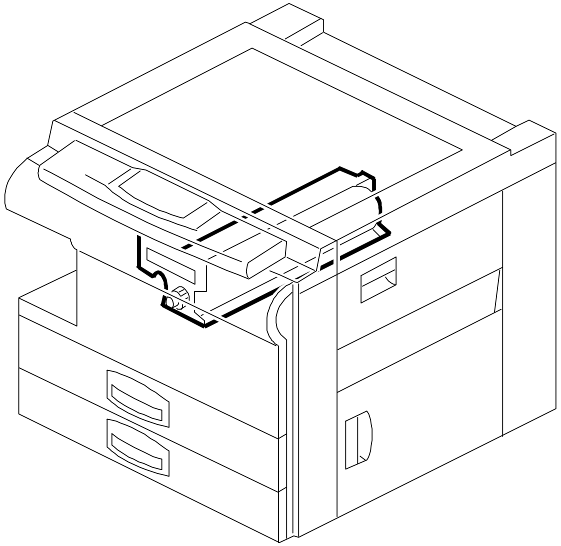
See Page 39

17.DRUM UNIT 1 (A212/A214)



See Page 41

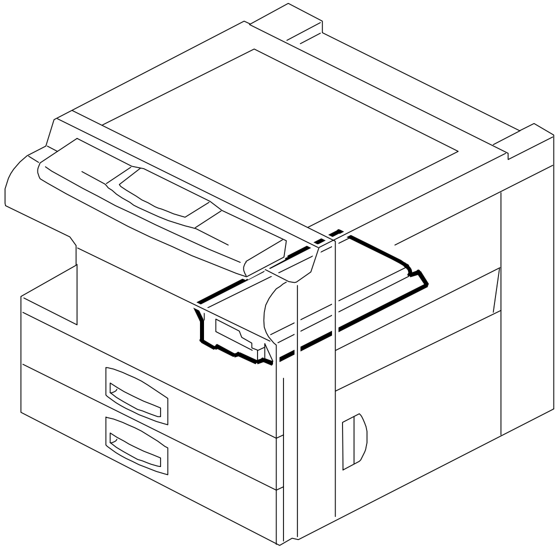
18.DRUM UNIT 2 (A212/A214)



See Page 43

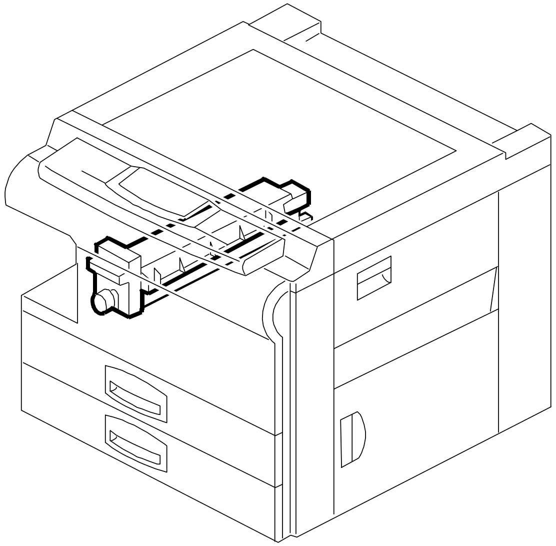
LOCATION OF UNIT

19.TRANSFER UNIT (A212/A214)



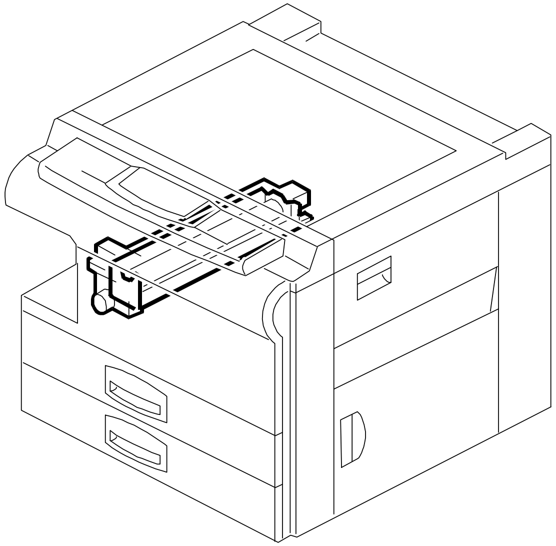
See Page 45

20.FUSING UNIT 1 (A212/A214)



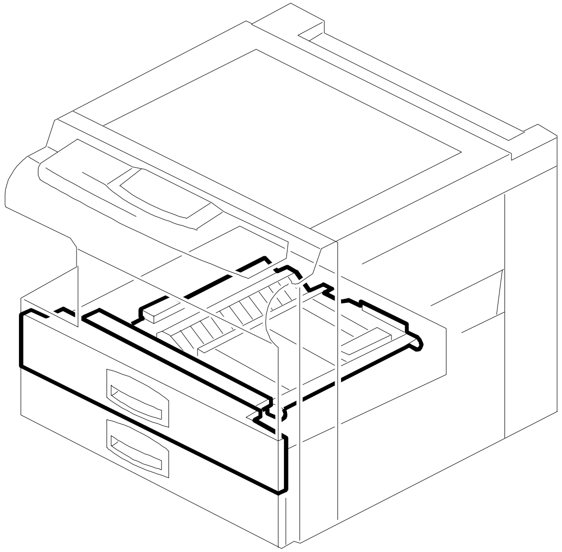
See Page 47

21.FUSING UNIT 2 (A212/A214)



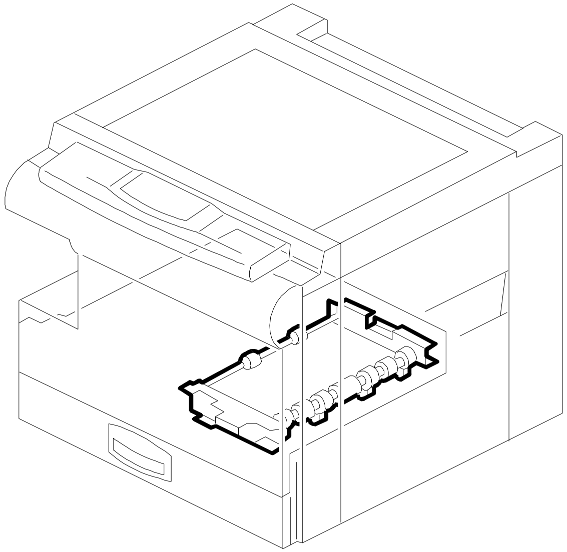
See Page 49

22.DUPLEX TRAY 1 (A214)



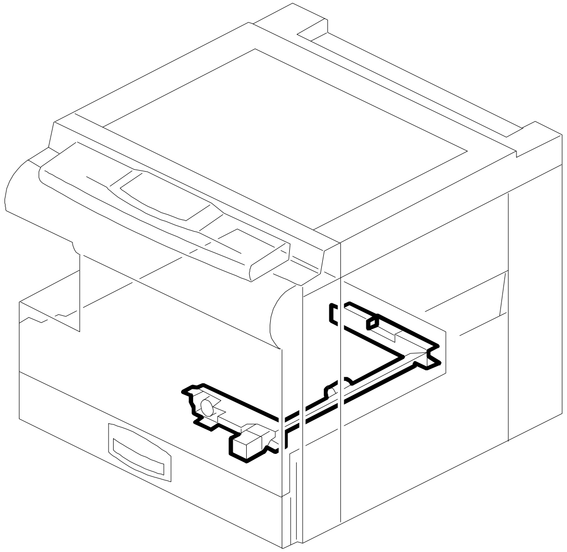
See Page 51

23.DUPLEX TRAY 2 (A214)



See Page 53

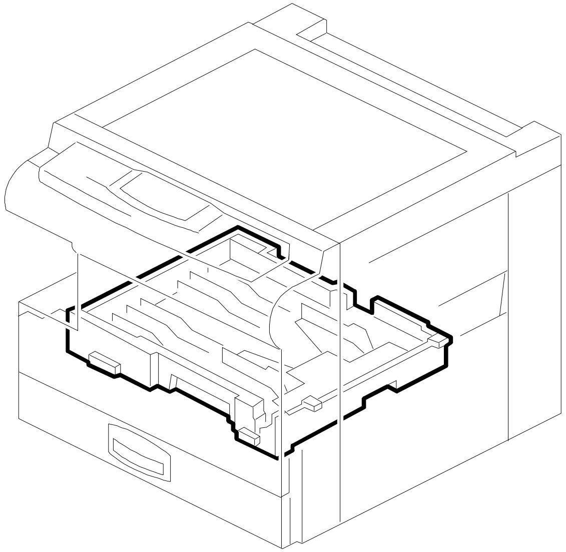
24.DUPLEX TRAY 3 (A214)



See Page 55

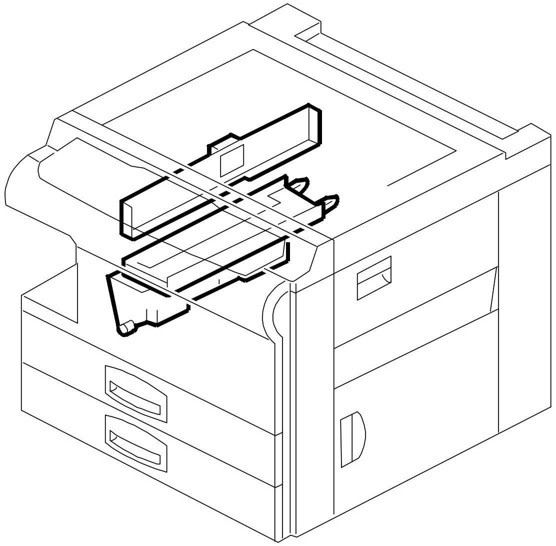
LOCATION OF UNIT

25.DUPLEX TRAY 4 (A214)



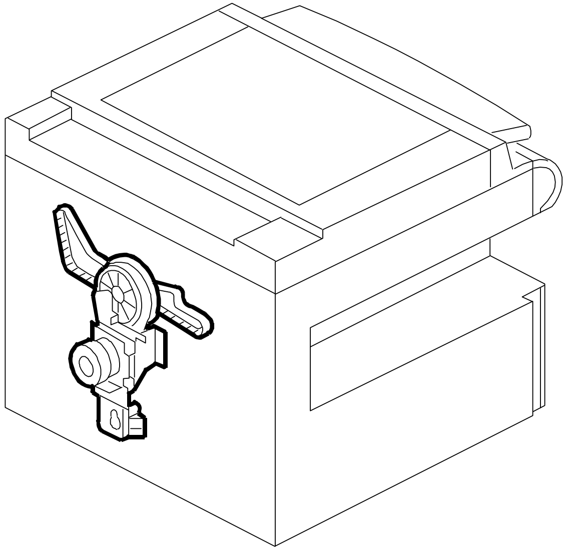
See Page 57

26.PAPER EXIT SECTION (A214)



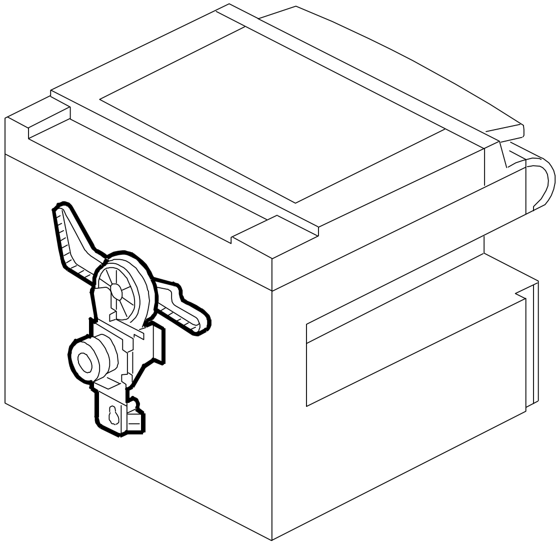
See Page 59

27.PAPER EXIT SECTION (A212)



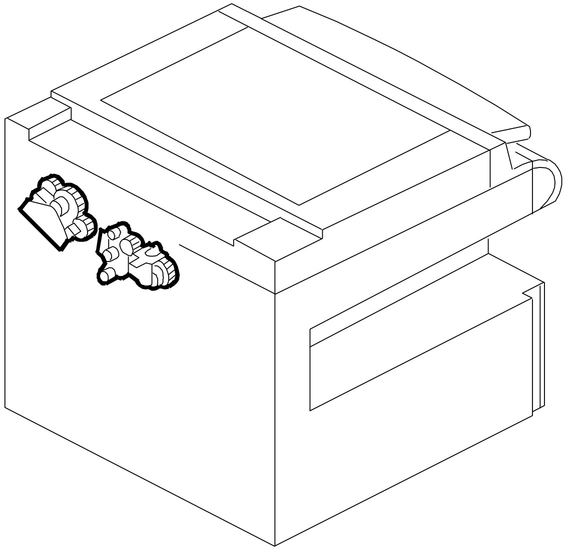
See Page 61

28.DRIVE SECTION 1 (A212/A214)



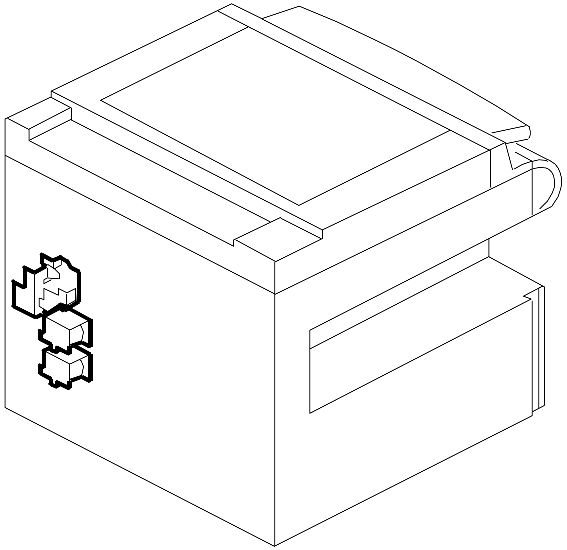
See Page 63

29.DRIVE SECTION 2 (A212/A214)



See Page 65

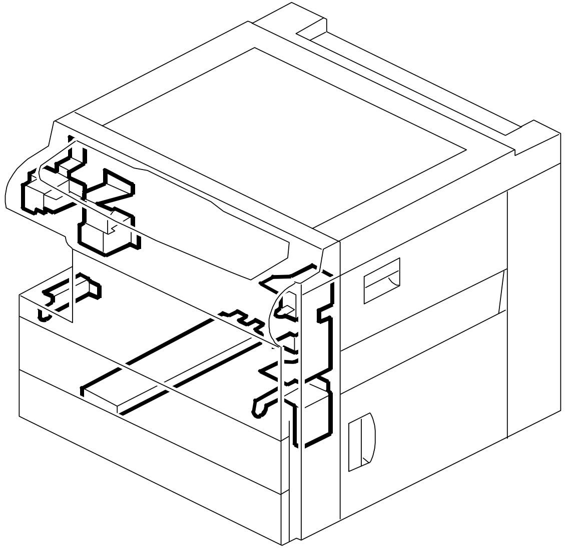
30.DRIVE SECTION 3 (A212/A214)



See Page 67

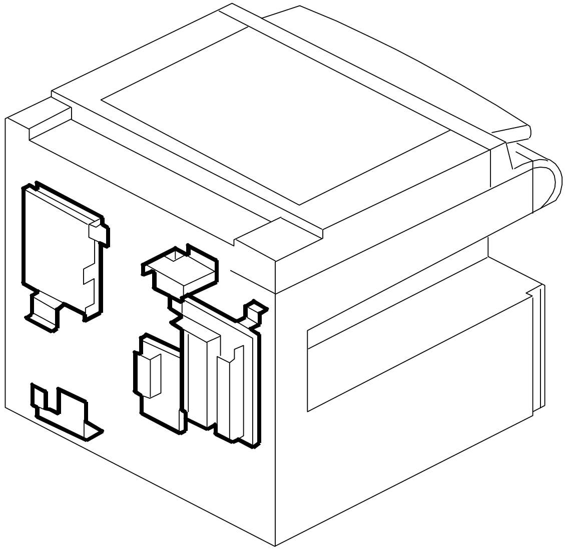
LOCATION OF UNIT

31.ELECTRICAL SECTION 1 (A212/A214)



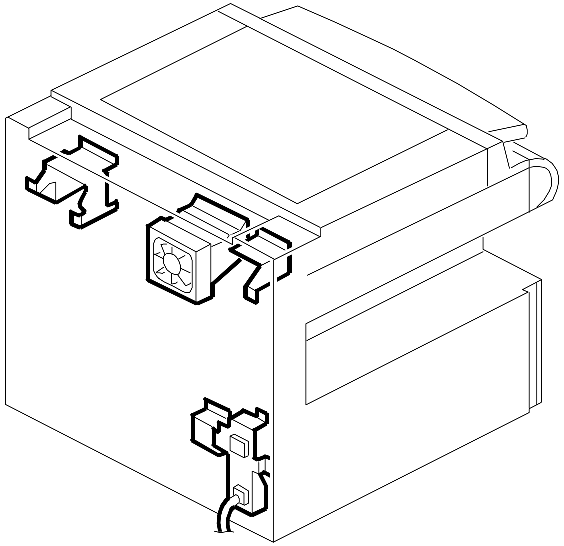
See Page 69

32.ELECTRICAL SECTION 2 (A212/A214)



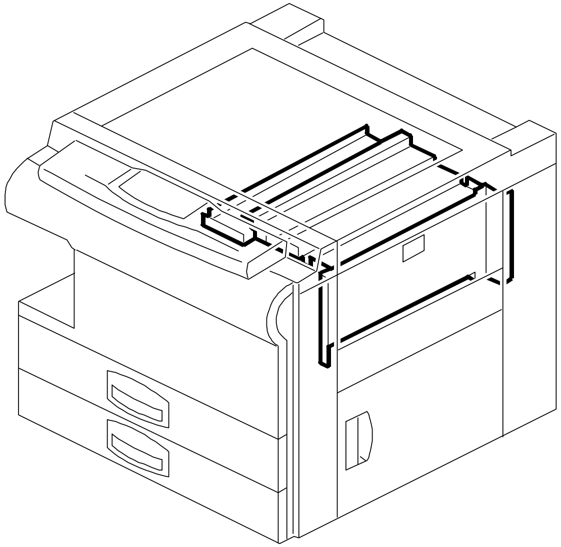
See Page 71

33.ELECTRICAL SECTION 3 (A212/A214)



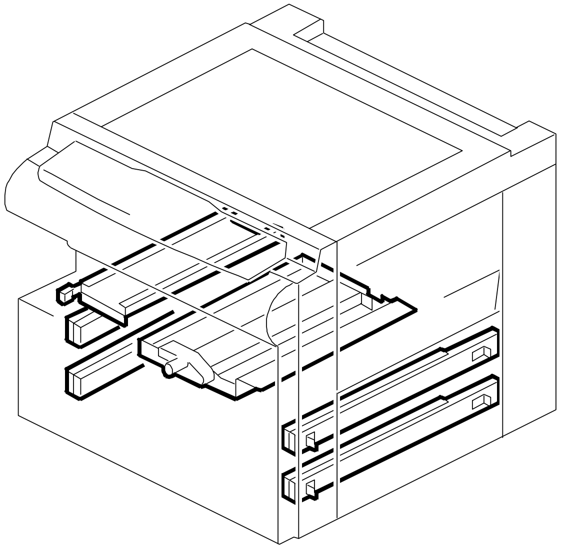
See Page 73

34.FRAME SECTION 1 (A212/A214)



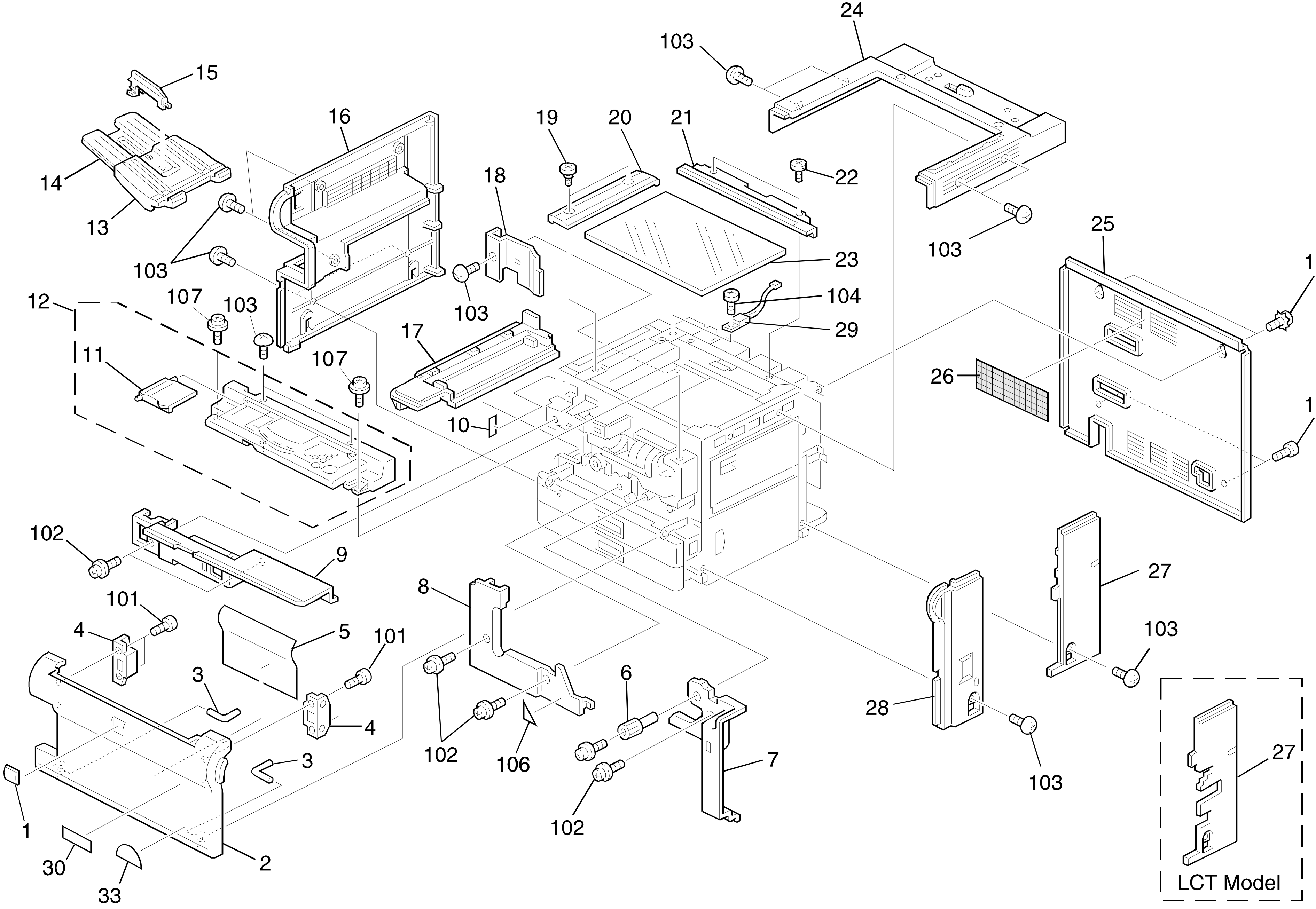
See Page 75

35.FRAME SECTION 2 (A212/A214)



See Page 77

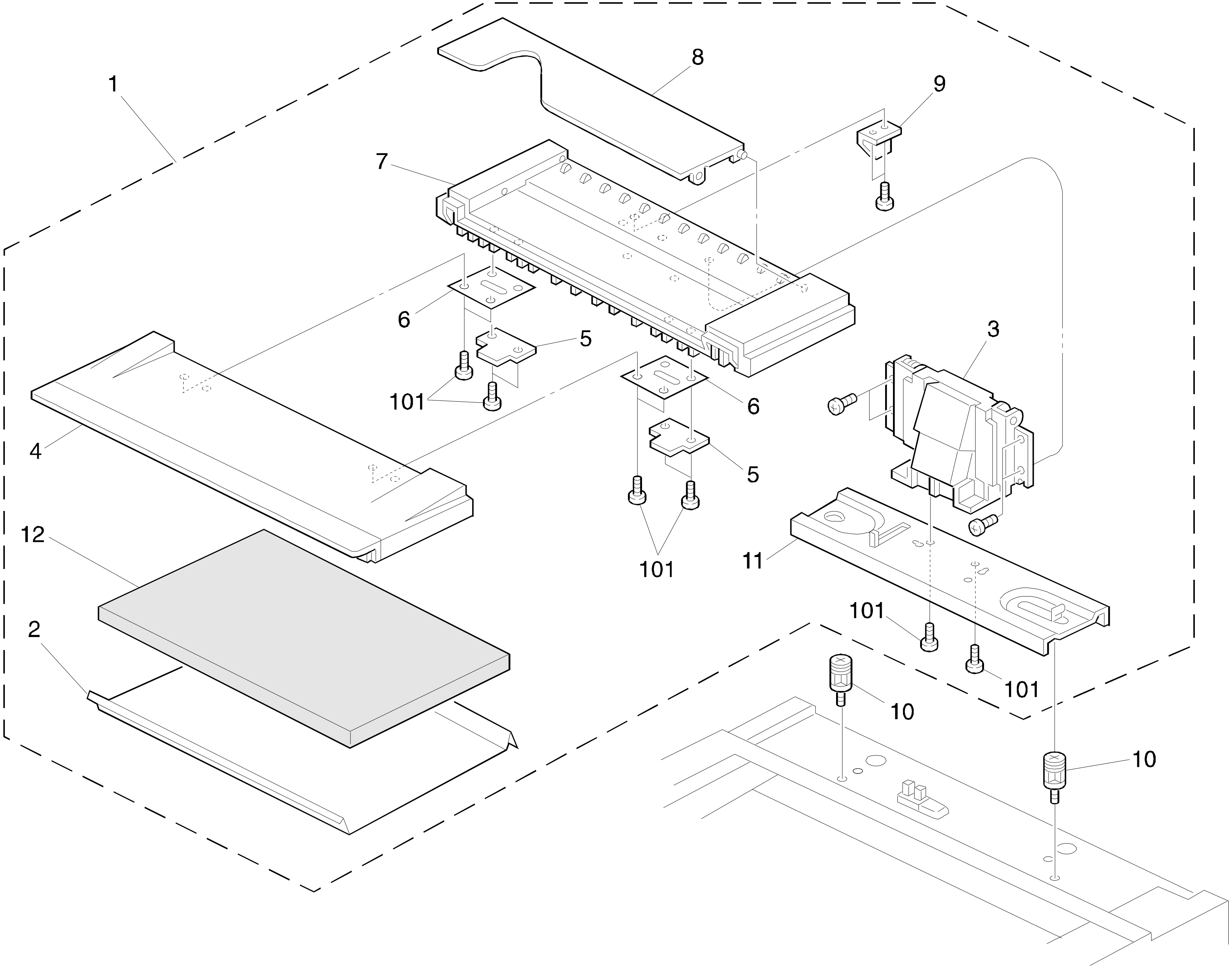
1.EXTERIOR (A212/A214)


24
103
15
16
19
20
21
22
14
13
18
103
103
25
105
23
103
104
12
107
103
29
11
17
107
26
103
10
103
102
9
27
8
101
4
5
101
3
103
6
4
28
3
7
102
106
27
1
102
103
30
2
33
LCT Model

1.EXTERIOR (A212/A214)

Index No.	Part No.	Description	Q'ty Per Assembly
1	A153 1285	Emblem (RIC)	1
1	A156 6413	Emblem (SVN)	1
1	A153 6423	Support Cover (INF)	1
2	A212 1282	Front Cover (A212)(RIC)	1
2	A212 6412	Front Cover (A212)(SVN)	1
2	A212 6422	Front Cover (A212)(INF)	1
2	A214 1277	Front Cover (A214)(RIC)	1
2	A214 6412	Front Cover (A214)(SVN)	1
2	A214 6422	Front Cover (A214)(INF)	1
2	A157 6403	Front Cover (NRG)	1
3	A153 1354	Hinge Pin	2
4	AG07 0004	Magnetic Catch	6
5	A157 1360	Operation Sheet (A212)	1
5	A158 1360	Operation Sheet (A214)	1
6	AG05 0074	Registration Knob	1
7	A212 1352	Inner Cover - Right Lower	1
8	A157 1339	Lower Inner Cover	1
9	A157 1351	Upper Inner Cover	1
10	A212 5829	Decal - Main Switc over (EU/ASIA/TWN)	1
11	A153 1469	Panel Cover	1
12	A212 1323	Operation Panel Ass'y - LT (A212)	1
12	A214 1325	Operation Panel Ass'y - LT (A214)	1
12	A212 1324	Operation Panel Ass'y - A4 (A212)	1
12	A214 1326	Operation Panel Ass'y - A4 (A214)	1
12	A212 1328	Operation Panel Ass'y (A212)(SVN)	1
12	A214 1328	Operation Panel Ass'y (A214)(SVN)	1
13	AF04 3083	Copy Tray	1
14	AF04 3076	Copy Tray Slide	1
15	AF04 3077	Copy Tray Guide	1
16	A212 1302	Left Cover	1
17	A157 1311	Left Innner Cover	1
18	A157 1321	Left Inner Cover - Small	1
19	AA14 3416	Stepped Screw - M4x3	2
20	AC04 2113	Left Original Scale - A4	1
20	AC04 2117	Left Original Scale - LT	1
21	AC04 2120	Rear Original Scale (A4)	1
21	AC04 2124	Rear Original Scale - LT	1
22	AA14 3417	Shoulder Screw - M4x4	2
23	AC01 2060	Exposure Glass - A3T-3.2	1
24	A153 1251	Upper Cover	1
25	A212 1291	Rear Cover	1
26	AA01 2080	Dust Filter	1
27	A212 1271	Rear Right Cover (A212)	1
27	A214 1331	Rear Right Cover (A214)	1
28	A212 1261	Front Right Cover	1
29	AW10 0027	Thermister	1
30	A212 6404	Decal - Model Name - GES (A212)	1
30	A212 6407	Decal - Model Name - NSA (A212)	1
30	A212 6414	Decal - Model Name - REX (A212)	1
30	A214 6404	Decal - Model Name - GES (A214)	1
30	A214 6407	Decal - Model Name - NSA (A214)	1
30	A214 6414	Decal - Model Name - REX (A214)	1
31	A212 8834	Operation panel Sheet - LT	1
31	A212 1485	Operation panel Sheet - A4	1
32	A212 5830	Decal - Main Switch /ASIA/TWN)	1
33	AA00 1389	Large Decal - Energ tar (NA)	1
34	C225 5867	Decal - Cover - Panel - Nashua	1
34	C225 5866	Decal - Key Top Co	1
34	A153 6409	Decal - Keytop Cove	1
101	0434 0082B	Tapping Screw - M4x8	
102	0964 4008B	Tapping Screw With Flat Washer - M4x8	
103	0802 5094	Tapping Truss Head Screw - M4x8	
104	0313 0040B	Philips Pan Head Screw - M3x4	
105	0953 4008M	Screw - M4X8	
106	1005 0890	Decal - TUV	
107	0964 4006B	Tapping Screw With Flat Washer - M4X6	

2.PLATEN COVER ASS'Y (A212/A214)

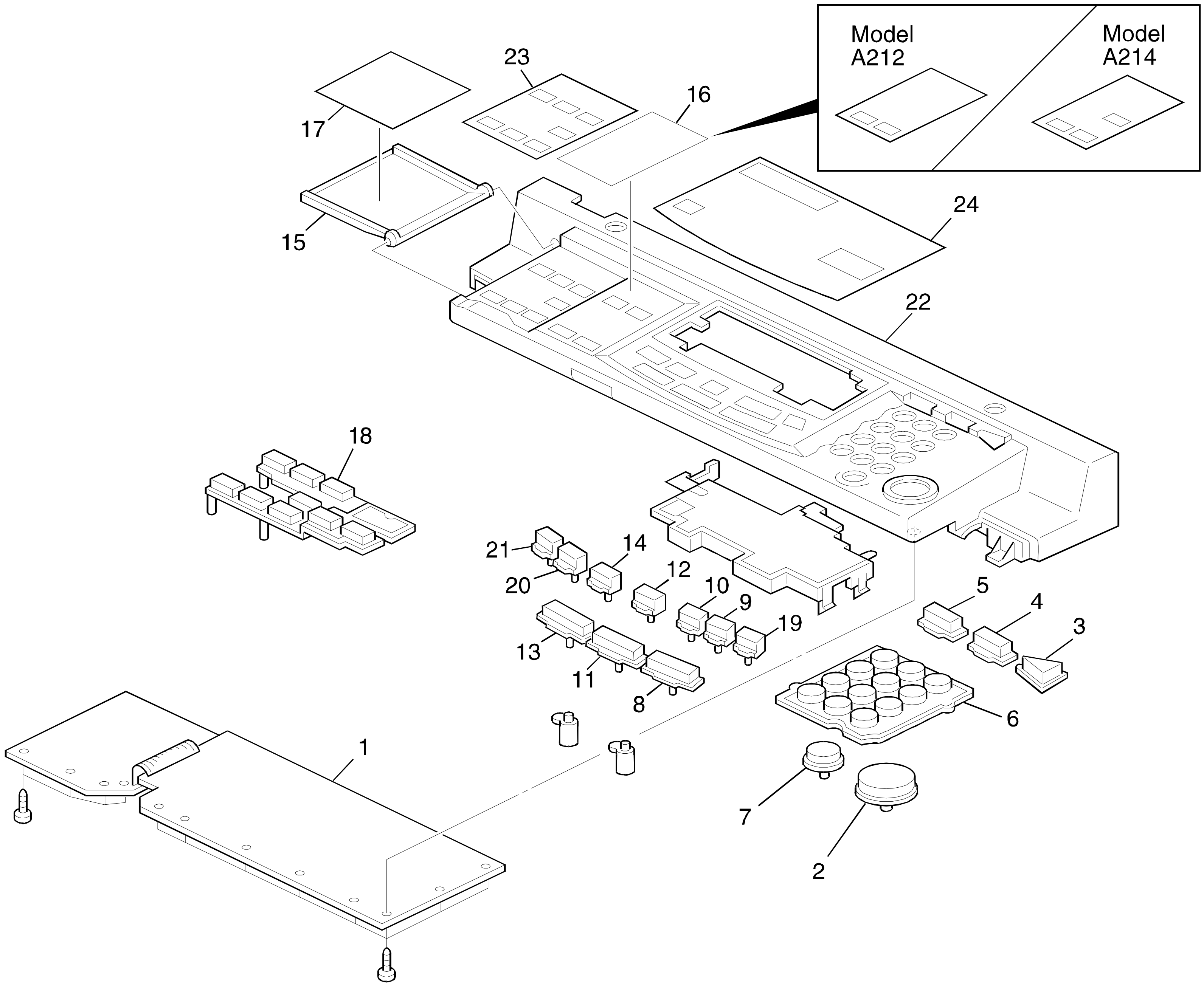

1
8
9
7
6
5
3
101
6
4
5
12
11
101
101
2
101
10
10

2.PLATEN COVER ASS’Y (A212/A214)

Index No.	Part No.	Description	Q’ty Per Assembly
1	A153 1369	Platen Cover Ass’y	1
2	5448 2804	Platen Cover Sheet	1
3	A153 1370	Platen Cover Hinge	1
4	A134 1394	Front Platen Cover	1
5	A053 1957	Flex Hinge - Platen Cover	2
6	AA16 2067	Platen Cover Pad	1
7	A134 1395	Rear Platen Cover	1
8	A134 1396	Original Holder	1
9	A153 1383	Platen Cover Feeler	1
10	AA14 8447	Platen Cover Stud	1
11	A153 1380	Platen Cover Bracket	1

Index No.	Part No.	Description	Q’ty Per Assembly
101	0414 0142B	Binding Self Tapping Screw - M4x14	

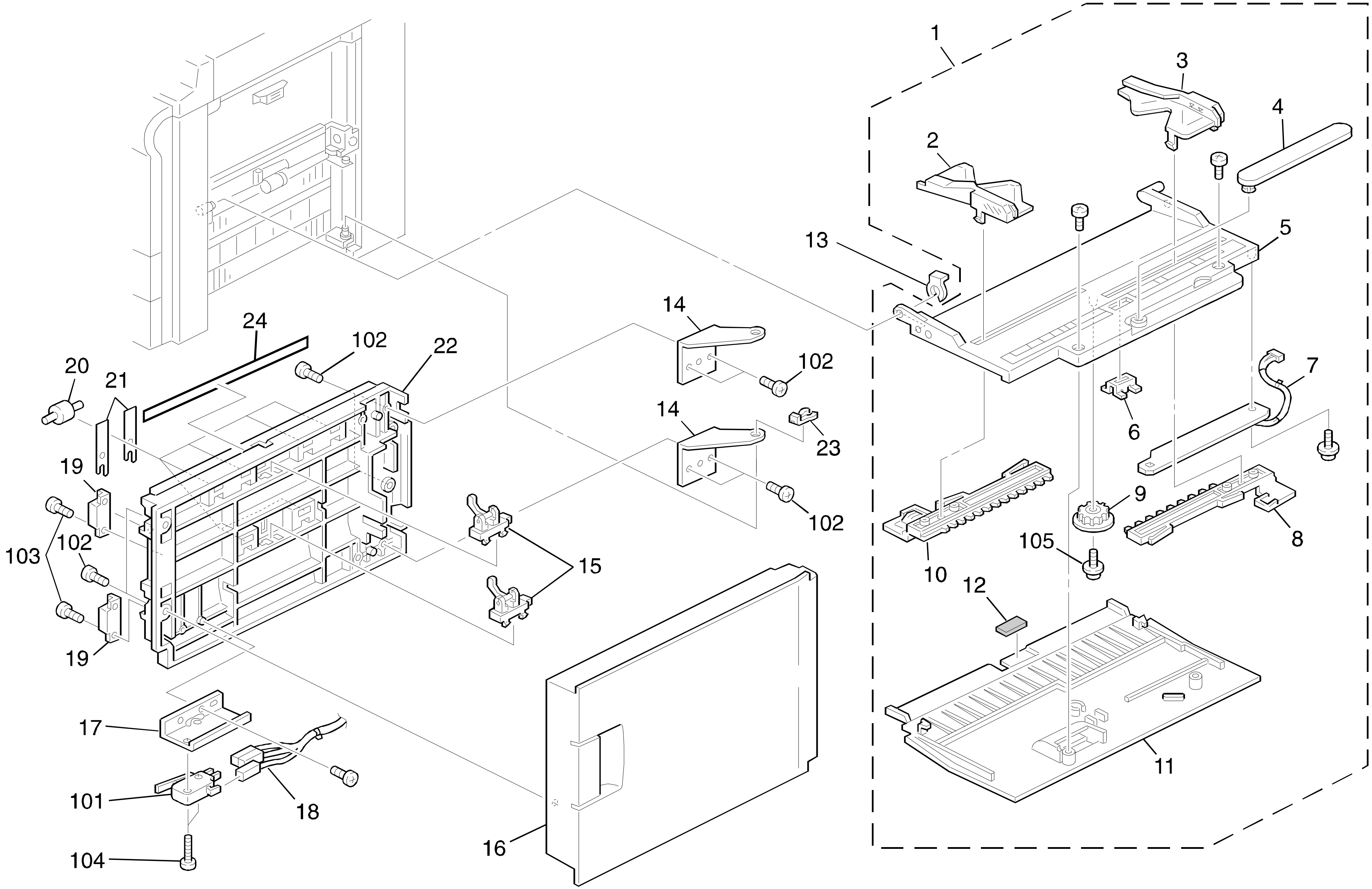
3.OPERATION PANEL UNIT (A212/A214)


Model
A212
Model
A214
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24

3.OPERATION PANEL UNIT (A212/A214)

Index No.	Part No.	Description	Q'ty Per Assembly
*	A212 1323	Operation Panel Ass’y - LT (A212)	1
*	A214 1325	Operation Panel Ass‘y - LT (A214)	1
*	A212 1324	Operation Panel Ass’y - A4 (A212)	1
*	A214 1326	Operation Panel Ass‘y - A4 (A214)	1
*	A212 1328	Operation Panel Ass‘y - LT (A212)(SVN)	1
*	A214 1328	Operation Panel Ass‘y - LT (A214)(SVN)	1
1	A212 5460	Operation Panel Board - LT (A212)	1
1	A212 5465	Operation Panel Board - A4 (A212)	1
1	A214 5460	Operation Panel Board - LT (A214)	1
1	A214 5465	Operation Panel Board - A4 (A214)	1
2	A153 1452	Key-top Start	1
2	A156 1452	Key-top Start (SVN)	1
3	A153 1453	Key-top Interrupt	1
3	A156 1453	Key-top Interrupt (SVN)	1
4	A153 1454	Key-top Mode Clear	1
4	A156 1454	Key-top Mode Clear (SVN)	1
5	A153 1455	Key-top Program	1
5	A156 1455	Key-top Program (SVN)	1
6	A153 1456	Key-top 10 Key	1
6	A156 1456	Key-top 10 Key (SVN)	1
7	A153 1457	Key-top Cler/Stop	1
7	A156 1457	Key-top Cler/Stop (SVN)	1
8	A153 1458	Key-top Auto Density	1
8	A156 1458	Key-top Auto Densty (SVN)	1
9	A153 1459	Key-top Derker	1
9	A156 1459	Key-top Derker (SVN)	1
10	A153 1460	Key-top Lighter	1
10	A156 1460	Key-top Lighter (SVN)	1
11	A153 1461	Key-top Auto Paper Select	1
11	A156 1461	Key-top Auto Paper Select (SVN)	1
12	A153 1462	Key-top Paper Select	1
12	A156 1462	Key-top Paper Select (SVN)	1
13	A153 1463	Key-top Full Size	1
13	A156 1463	Key-top Full Size (SVN)	1
14	A153 1464	Key-top Auto Reduce/Enlarge	1
14	A156 1464	Key-top Auto Reduce/Enlarge (SVN)	1
15	A153 1469	Panel Cover	1
16	A214 1493	Paper Exit Sheet - LT (A214)	1
16	A214 1483	Paper Exit Sheet - A4 (A214)	1
16	A212 1493	Sheet Sorter - LT (A212)	1
16	A212 1483	Sorter Sheet - A4 (A212)	1
16	A212 1487	Sorter Sheet (A212)(SVN)	1
16	A214 1487	Sorter Sheet (A214)(SVN)	1
17	A212 1495	Operation Panes Sheet - LT	1
17	A214 1485	Operation Panes Sheet - A4	1
18	A153 1465	Key-top - Sorter	1
18	A212 1465	Key-top - Sorter (SVN)	1
19	A204 1471	Keytop - Halftone	1
19	A207 1471	Keytop - Halftone (SVN)	1
20	A204 1472	Keytop - Enlarge	1
20	A207 1472	Keytop - Enlarge (SVN)	1
21	A204 1473	Keytop - Reduce	1
21	A207 1473	Keytop - Reduce (SVN)	1
22	A212 1491	Operation Panel Case - LT	1
22	A212 1481	Operation Panel Case - A4	1
23	A212 1494	Operation Panel Sheet	1
24	A212 1492	Display Panel - LT (A212)	1
24	A212 1482	Display Panel - A4 (A212)	1
24	A214 1492	Display Panel - LT (A214)	1
24	A214 1482	Display Panel - A4 (A214)	1

4.BY-PASS FEED SECTION (A212/A214)

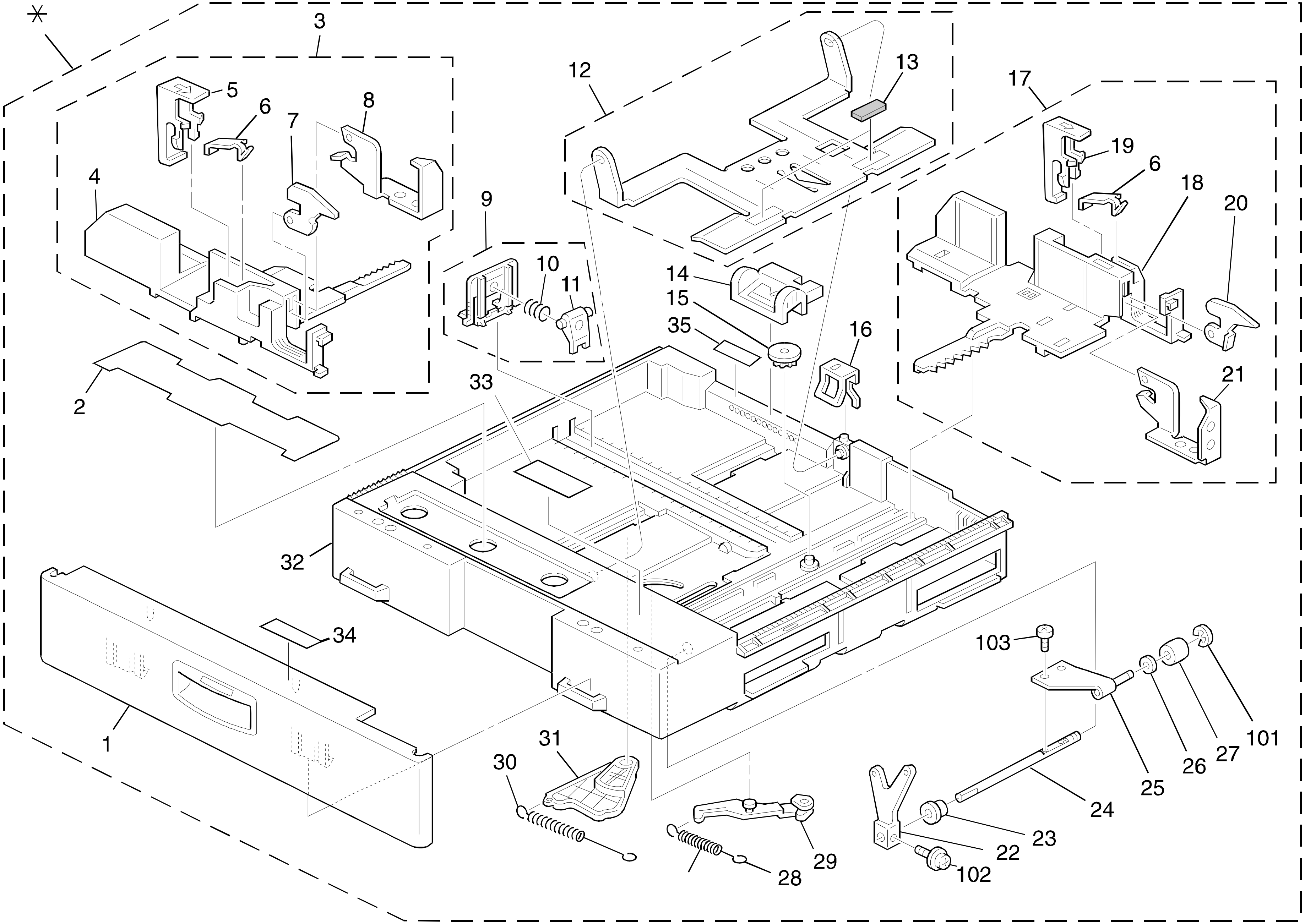

1
3
4
2
5
13
14
24
102
22
102
20
21
7
14
6
23
19
102
9
103
102
15
105
8
10
12
19
17
11
101
18
104
16

4.BY-PASS FEED SECTION (A212/A214)

Index No.	Part No.	Description	Q'ty Per Assembly
1	A212 2692	By-pass Feed Table Ass'y	1
2	A212 2711	Front Side Fence	1
3	A212 2716	Rear Side Fence	1
4	A134 2701	By-pass Feed Guide	1
5	A212 2697	By-pass Feed Table	1
6	A212 2705	Magnet Catch Plate	1
7	A212 2534	Paper Size Sensor Board	1
8	A212 2706	Rear Fence Rack	1
9	G011 3305	Gear - 16T	2
10	A212 2707	Front Fence Rack	2
11	A212 2746	By-pass Feed Cover	1
12	**5447 2927**	**Friction Pad - B**	**1**
13	5215 2621	Snap Ring - M6	3
14	A212 2586	Hinge Bracket (A212)	1
15	AW02 0069	Photointerruptor	2
16	A212 2591	Vertical Transfer (A212)	1
17	A212 2559	Switch Bracket	1
18	A157 5336	Vertical Transport [illegible]ness	1
19	AG07 0004	Magnetic Catch	6
20	AF02 2079	Vertical Driven Roller	6
21	A157 2557	Spring Plate	12
22	A212 2571	Vertical Transport Guide (A212)	1
23	5447 2681	Snap Ring (A212)	7
24	A214 2878	Mylar - Paper Guid[illegible]U)	1

Index No.	Part No.	Description	Q'ty Per Assembly
101	1204 2356	Micro Switch - AM51612A531	
102	0414 0082W	Tapping Screw With Flat Washer - M4x8	
103	0802 5085	Tapping Screw - M4x8	
104	0313 0140B	Philips Pan Head Screw - M3x14	
105	0965 3006B	Tapping Screw With Flat Washer M3x6	

5.PAPER TRAY SECTION (A212/A214)

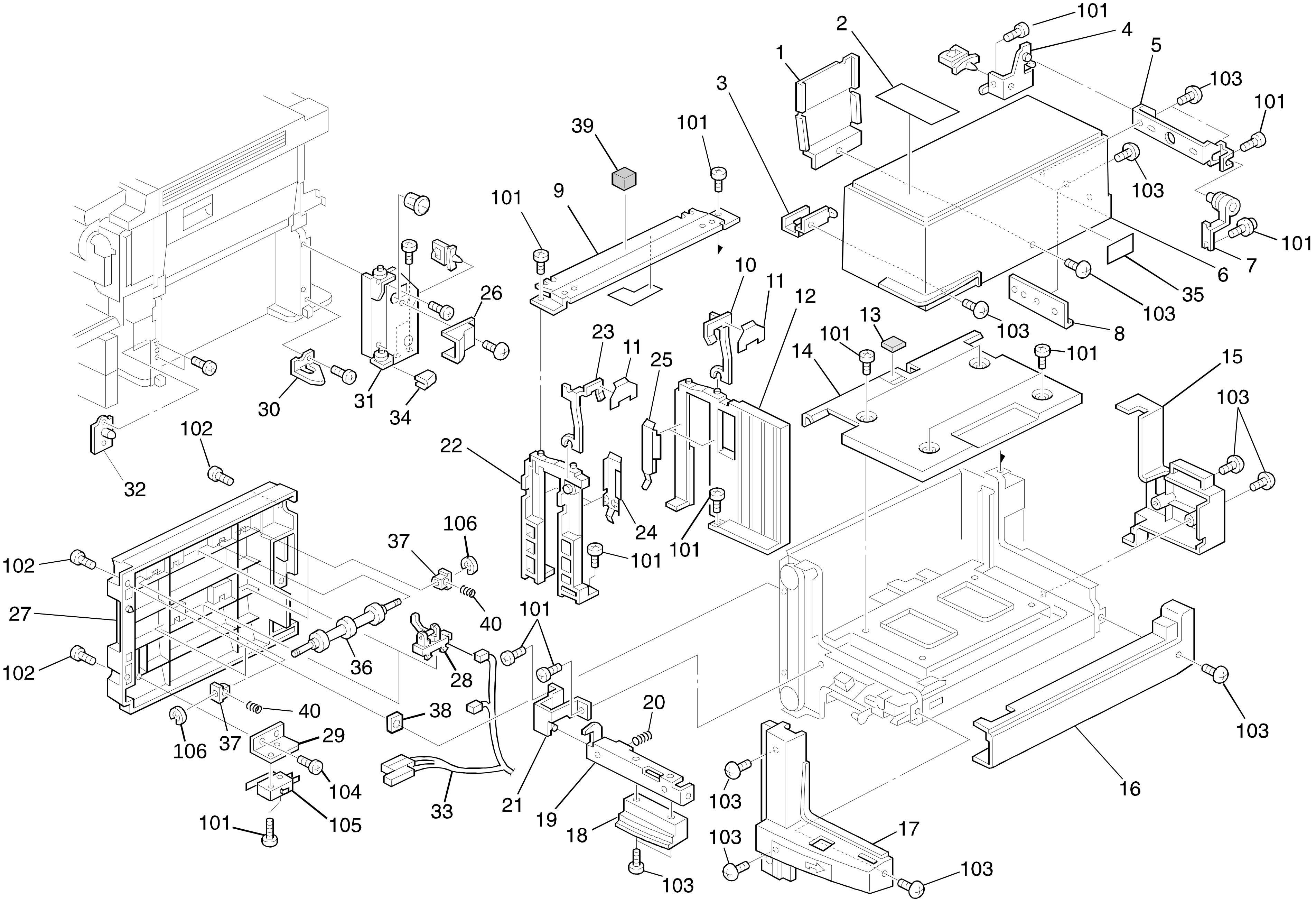

*
3
5
6
7
8
4
12
13
17
19
6
18
20
9
10
11
14
15
35
16
21
33
2
32
34
1
103
101
27
26
25
24
23
22
102
31
30
29
28

5.PAPER TRAY SECTION (A212/A214)

Index No.	Part No.	Description	Q'ty Per Assembly
*	A212 2533	Paper Tray Ass'y (LT)	1
*	A212 2757	Paper Tray Ass'y (A4)	1
1	A212 2956	Paper Feed Front Cover	1
2	A212 2758	Decal - Paper Set Dirtection	1
3	A212 2581	Front Side Fence Ass'y	1
4	A212 2661	Adjusting Plate - Front	1
5	A219 2664	Front Stopper Lever	1
6	A212 2769	Rear Stopper Spring	1
7	A212 2871	Adjusting Plate Front	1
8	A212 2582	Front Corner Separator	1
9	A212 2844	End Fence Ass'y	1
10	A219 2656	End Fence Spring	1
11	A219 2558	End Fence Guide	1
12	A212 2542	Bottom Plate Ass'y	1
13	**G020 2645**	**Friction Pad**	**1**
14	AF01 5027	Paper Size Slider	1
15	AB01 3868	Gear - 16Z	1
16	A212 2765	Spring Plate - Gear Side Fence	1
17	A212 2547	Rear Side Fence Ass'y	1
18	A212 2567	Rear Side Fence	1
19	A219 2642	Rear Lever Stopper	1
20	A212 2870	Adjusting Plate Rear	1
21	A212 2583	Rear Corner Separator	1
22	A219 2597	Bottom Plate Lever	1
23	AA08 0111	Bushing - 8x12x7	1
24	A219 2591	Paper Lift Shaft	1
25	A219 2574	Paper Lift Arm Ass'y	1
26	A096 3863	Spacer - 4x6x1	1
27	A219 2577	Paper Lift Roller	1
28	A219 2541	Spring	1
29	A219 2585	Lever	1
30	A219 2543	Spring	1
31	A212 2982	Paper Lift Shutter	1
32	A212 2590	Paper Tray	1
33	A212 2805	Tray Bottom Plate Sheet	1

Index No.	Part No.	Description	Q'ty Per Assembly
34	A219 2692	Decal - Operating	1
35	A153 2996	Decal Paper Size - A4/A3	1
35	A153 2995	Decal Paper Size - LT/DLT	1
101	0720 0030E	Retaining Ring - M3	
102	0960 4012W	Philips Flange Screw - M4x12	
103	0453 4006B	Tapping Screw - 4x6	

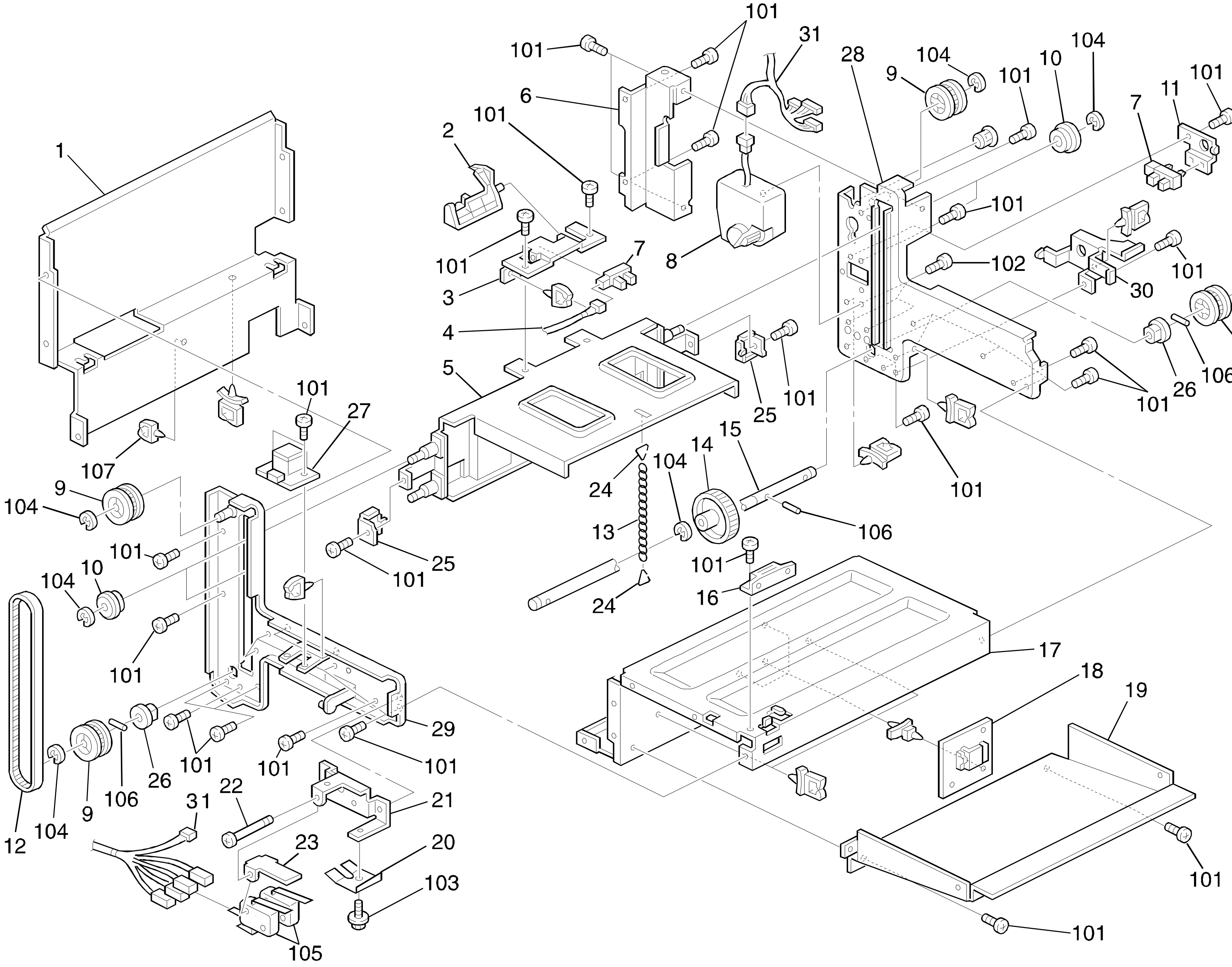
6.LCT UNIT 1 (A214)


101
2
4
1
5
103
101
3
39
101
101
9
103
101
7
26
10
11
12
6
35
103
13
101
101
103
8
23
11
25
14
15
103
30
31
34
22
32
102
106
37
24
101
101
102
27
40
101
36
28
102
38
40
20
103
16
106
37
29
104
105
101
33
21
19
18
103
103
17
103
103
103

6.LCT UNIT 1 (A214)

Index No.	Part No.	Description	Q'ty Per Assembly
1	A155 6324	End Fence	1
2	A155 6113	Decal - Paper Set	1
3	A155 6207	Cover Bracket	1
4	A155 6303	Fix Hinge	1
5	A155 6302	Hinge Angle	1
6	A155 6101	LCT Upper Cover	1
7	A335 3251	Top Cover Hinge	1
8	A155 6201	LCT Hinge Bracket	1
9	A155 6251	Upper Stay	1
10	A155 6312	Rear Paper Holder	1
11	A155 6313	Support Guide	2
12	A155 6307	Rear Side Fence	1
13	**A421 2543**	**Friction Pad**	**1**
14	A155 6142	LCT Paper Tray	1
15	A155 6221	LCT Rear Cover	1
16	A155 6231	LCT Right Cover	1
17	A155 6191	LCT Front Cover	1
18	A155 6181	Knob	1
19	A155 6171	Grip Bracket	1
20	AA06 3239	Spring - Handle	1
21	A155 6170	Hinge Bracket	1
22	A155 6306	Front Side Fence	1
23	A155 6311	Front Paper Holder	1
24	A155 6321	Front Spring Plate	2
25	A155 6322	Rear Sprig Plate	2
26	A155 6241	LCT Harness Cover	1
27	A214 2571	Vertical Transport Guide	1
28	AW02 0069	Photointerruptor	2
29	A212 2559	Switch Bracket	1
30	A155 6169	Hinge Holder	1
31	A214 6460	Lower Hinge	1
32	A214 6175	LCT Positioning Pla	1
33	A155 5349	LCT Vertical Harness	1
34	A155 6162	Cushion	1
35	A155 6114	Caution Decal - LCT	1
36	AF02 0330	Vertical Driven Roller	2
37	AA08 0034	Bushing - 4x5x7	4
38	A155 6112	Spacer - LCT	1
39	A155 6270	Cushion 20x30	1
40	AA06 3538	Spring - 10mm	4
101	0434 0060B	Philips Tapping Screw - M4x6	
102	0414 0080B	Tapping Screw - M4x8	
103	0802 5094	Tapping Truss Head Screw - M4x8	
104	1204 2356	Micro Switch - AM51612A531	
106	0720 0030E	Retaining Ring - M	

7.LCT UNIT 2 (A214)

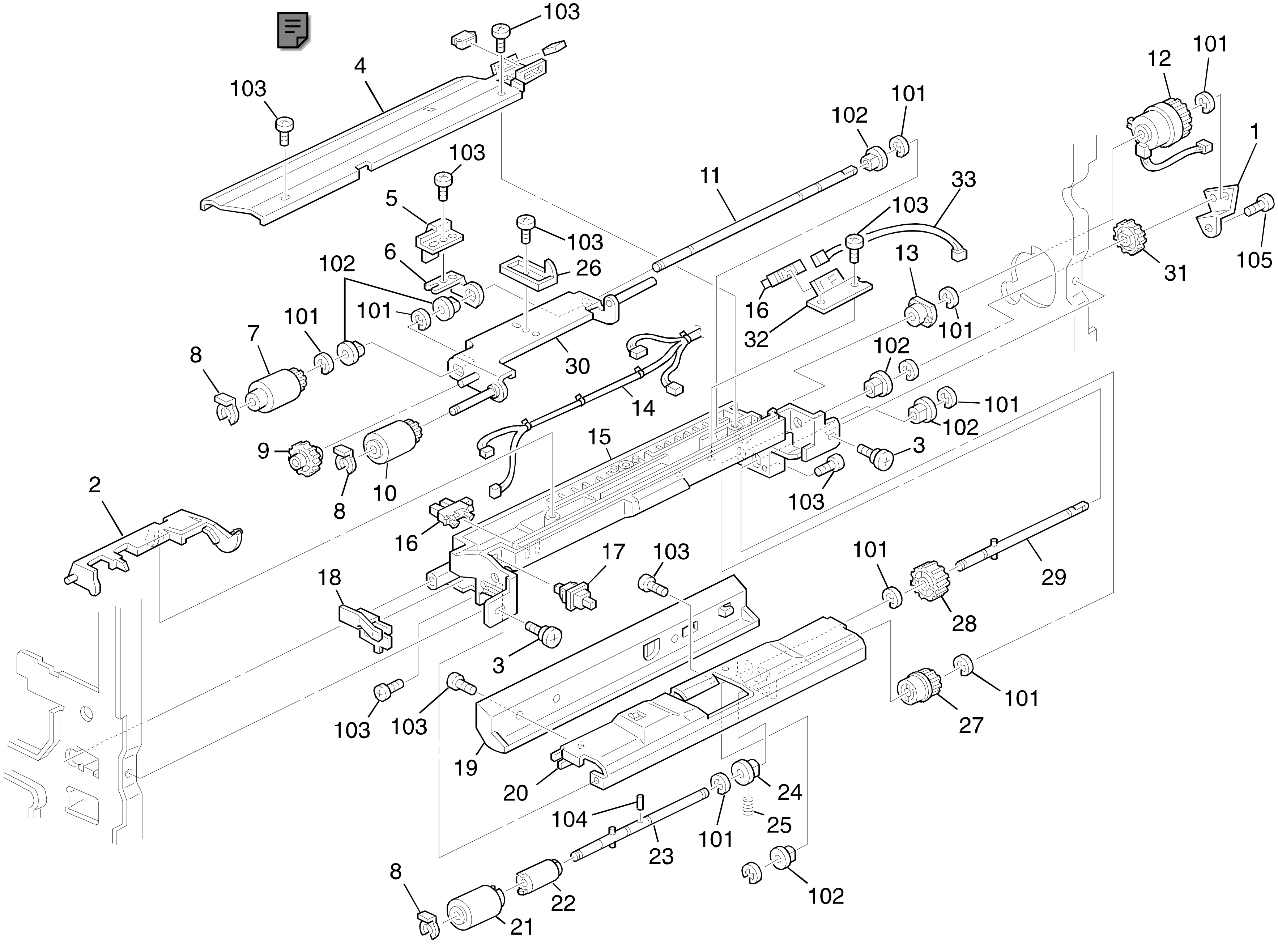

101
31
101
28
104
104
9
101
10
12
6
101
11
101
2
7
1
101
101
8
102
101
7
30
3
4
104
9
106
26
101
5
25
101
101
101
27
15
14
104
107
24
101
9
104
106
13
101
25
104
10
101
16
24
17
101
18
19
29
101
101
26
101
101
22
31
21
106
9
104
12
23
20
103
101
101
105

7.LCT UNIT 2 (A214)

Index No.	Part No.	Description	Q'ty Per Assembly
1	A155 6143	Left Bracket	1
2	A155 6148	Paper End Sensor Feeler	1
3	A155 6147	Paper End Sensor Bracket	1
4	A155 5348	Paper End Sensor Harness	1
5	A155 6203	Paper Tray Stay	1
6	A155 6153	Upper Hinge	1
7	AW02 0075	Photointerrupter	2
8	AX05 0090	Motor - DC 24V 36W	1
9	AB03 0281	Timing Pulley - 28Z	4
10	A335 4351	Guide Roller	4
11	A155 6136	Lift Sensor Bracket	1
12	AA04 3456	Timing Belt - S3M167	2
13	5925 2258	Stopper Chain	1
14	AB01 1133	Gear - 49Z	1
15	AA14 0576	LCT Drive Shaft	1
16	AG07 0004	Magnetic Catch	1
17	A155 6141	Tray Bottom Plate	1
18	A155 5165	LCT Main Board	1
19	A155 6145	Tray Cover	1
20	A155 6118	Spring Plate	1
21	A155 6116	Safety Switch Bracket	1
22	A300 3155	Stepped Screw - M25x32	1
23	A155 6117	Safety Switch Lever	1
24	A355 1341	Chain Hook	2
25	A335 4352	Timing Belt Clamp	2
26	5053 0223	Bushing - 8mm	2
27	A155 5170	Push Switch	1
28	A155 6125	Rear Side Bracket	1
29	A155 6110	Front Side Plate	1
30	A155 6215	Harness Guide	1
31	A155 5342	LCT Harness	1

Index No.	Part No.	Description	Q'ty Per Assembly
101	0434 0060B	Philips Tapping Screw - M4x6	
102	0802 5236	Tapping Screw - M4x8	
103	0443 0060B	Hexagon Tapping Screw - M3x6	
104	0720 0060E	Retaining Ring - M6	
105	1204 2355	Micro Switch - AM51632A531	
106	0623 0160E	Spring Pin - 3x16mm	
107	1105 0199	Clamp	

8.PAPER FEED SECTION 1 (A212/A214)

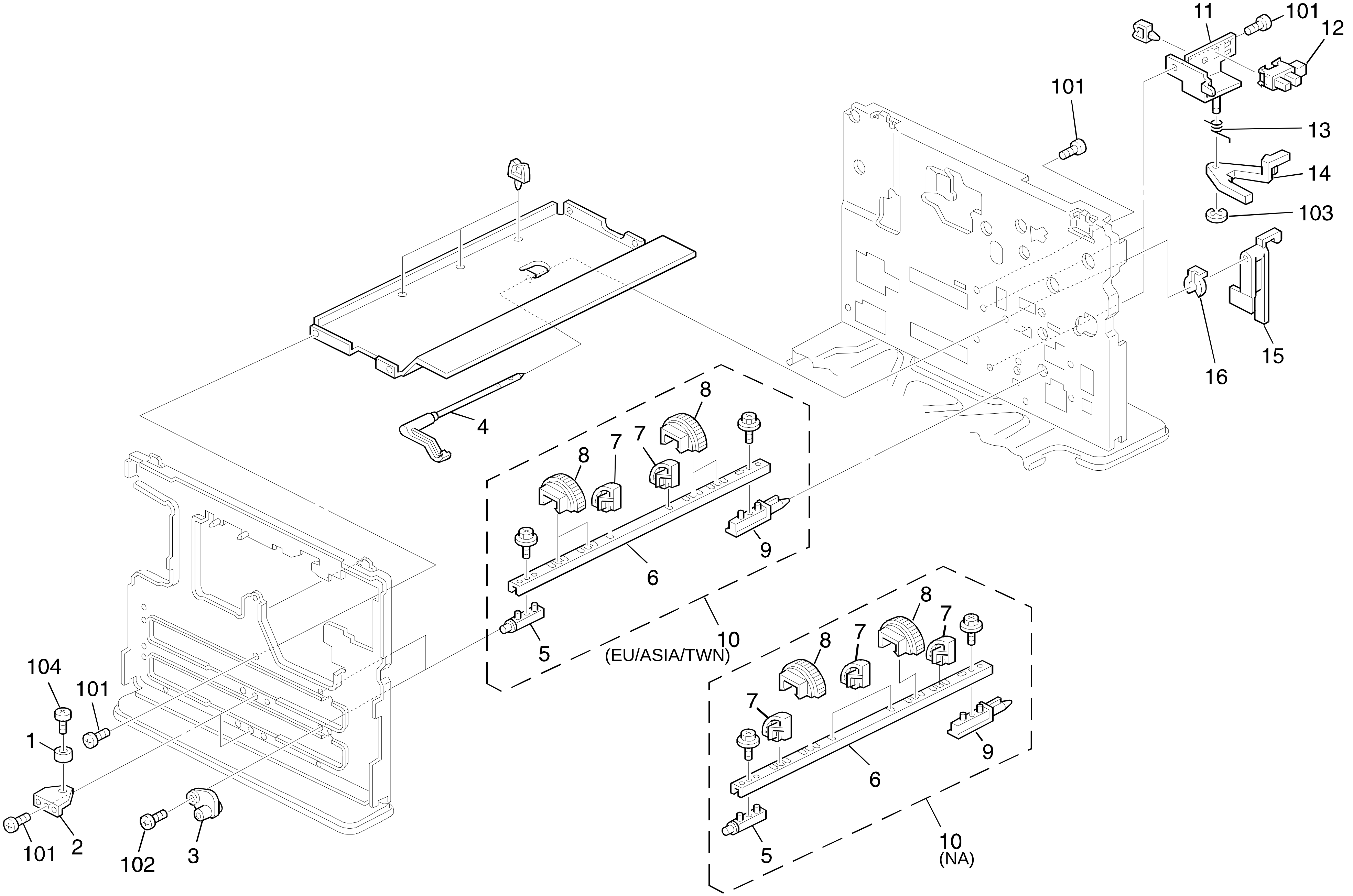

103
4
103
103
101
12
101
102
1
11
103
33
103
5
103
26
105
31
6
102
13
101
101
16
7
32
101
8
30
102
14
101
102
15
9
3
103
8
10
2
16
103
17
103
101
29
18
28
3
103
103
101
27
19
20
24
104
25
101
23
8
102
22
21

8.PAPER FEED SECTION 1 (A212/A214)

Index No.	Part No.	Description	Q'ty Per Assembly
1	A134 2688	Positioning Plate	1
2	A212 2660	Paper End Feeler	1
3	AA14 3219	Stepped Screw	2
4	A212 2671	By-pass Feed Cover	1
5	A134 2658	Grounding Plate	1
6	A134 2656	Stopper Plate	2
7	**AF03 1025**	**Feed Roller**	**1**
8	5447 2681	Snap Ring	7
9	AB01 1343	Idle Gear - 23Z	1
10	**AF03 0024**	**Pick-up Roller**	**1**
11	AA14 0534	Feed Shaft	1
12	AX20 0101	Magnetic Clutch - 2.5kgf 35Z	1
13	AA08 3010	Clutch Roller - 6x14x10	1
14	A134 5311	By-pass Feed Harness	1
15	A212 2659	By-pass Feed Housing	1
16	AW02 0075	Photointerrupter	15
17	AW50 0012	Push Switch	2
18	A134 2662	Grounding Plate	1
19	A212 2670	Rear Guide Plate	1
20	A212 2663	Separation Guide	1
21	**AF03 2025**	**Separation Roller**	**1**
22	A134 2674	Torque Limitter - 400fg	1
23	A134 2668	Separation Driven Shaft	1
24	A155 2667	Lift Sensor Feeler (A[illegible]4)	1
24	AA08 0037	Bushing - 6 mm	1
25	AA06 3499	Pressure Spring	1
27	AB01 1344	Gear - 16Z	1
28	AB01 1345	Gear - 20Z	1
29	A134 2667	Separation Drive Shaft	1
30	A212 2658	Pick-up Arm	1
31	AB01 1346	Gear - 27Z	1
32	A155 2682	Lift Sensor Bracket (A214)	1
33	A155 5345	CT Harness (A214)	1

Index No.	Part No.	Description	Q'ty Per Assembly
101	0720 0040E	Retaining Ring - M4	
102	0805 3480	Bushing - 6mm	
103	0414 0080B	Tapping Screw - M4x8	
104	0622 0100E	Spring Pin - 2x10mm	

9.PAPER FEED SECTION 2 (A212/A214)

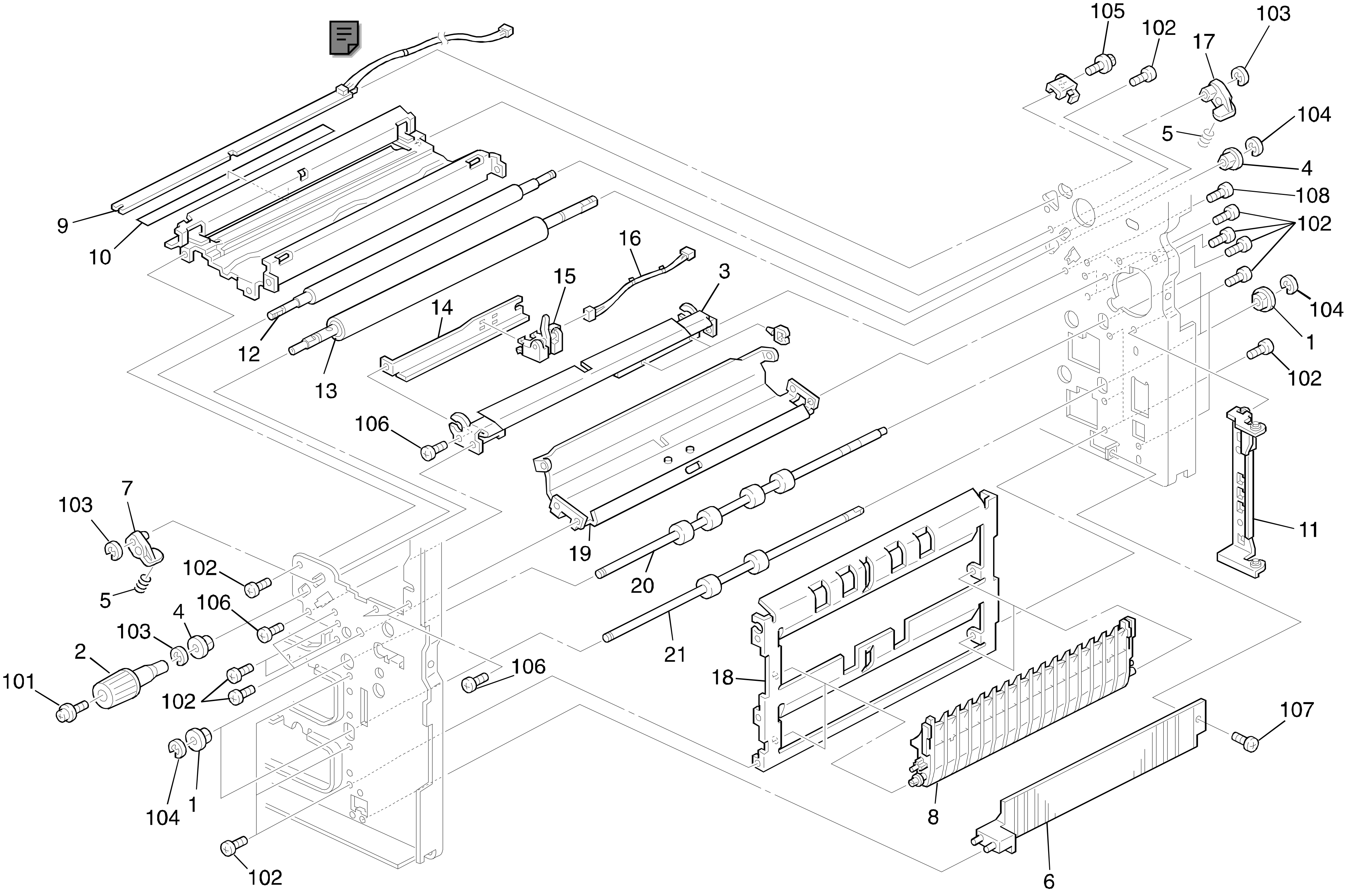

11
101
12
101
13
14
103
15
16
4
8
7
7
8
9
6
5
10
(EU/ASIA/TWN)
104
101
1
101
2
102
3
8
7
8
7
7
9
6
5
10
(NA)

9.PAPER FEED SECTION 2 (A212/A214)

Index No.	Part No.	Description	Q'ty Per Assembly
1	A212 1099	Stopper	1
2	A212 1073	Stopper Bracket	2
3	A212 2587	Feed Roller Bushing - Front	1
4	A212 2802	Feeler Paper End Sensor	1
5	G020 2585	Front Pin - Paper Feed Roller	1
6	A212 2575	Shaft - Paper Feed Roller (EU/ASIA/TWN)	1
6	G020 2570	Shaft - Paper Feed Roller (NA)	1
7	G020 2565	Paper Guide	2
8	**G020 2555**	**Paper Feed Roller**	**4**
9	G020 2586	Rear Pin - Paper Feed Roller	1
10	A212 2570	Paper Feed Roller Ass'y (EU/ASIA/TWN)	1
10	G020 2554	Paper Feed Roller Ass'y (NA)	1
11	A157 2800	Paper End Sensor Bracket	1
12	AW02 0086	Photointerruptor	1
13	A212 2524	Spring	1
14	A212 2905	Release Arm - Paper End	1
15	A157 2804	Shield Plate - Paper End Sensor	1
16	5447 2681	Snap Ring	1
17	A212 1087	Middle Upper Stay	1

Index No.	Part No.	Description	Q'ty Per Assembly
101	0434 0060B	Philips Tapping Screw - M4x6	
102	0414 0080B	Tapping Screw - M4x8	
103	0720 0040E	Retaining Ring - M4	
104	0443 0060W	Hexagon Head Tap Screw - M3x6	

10.PAPER REGISTRATION (A212/A214)

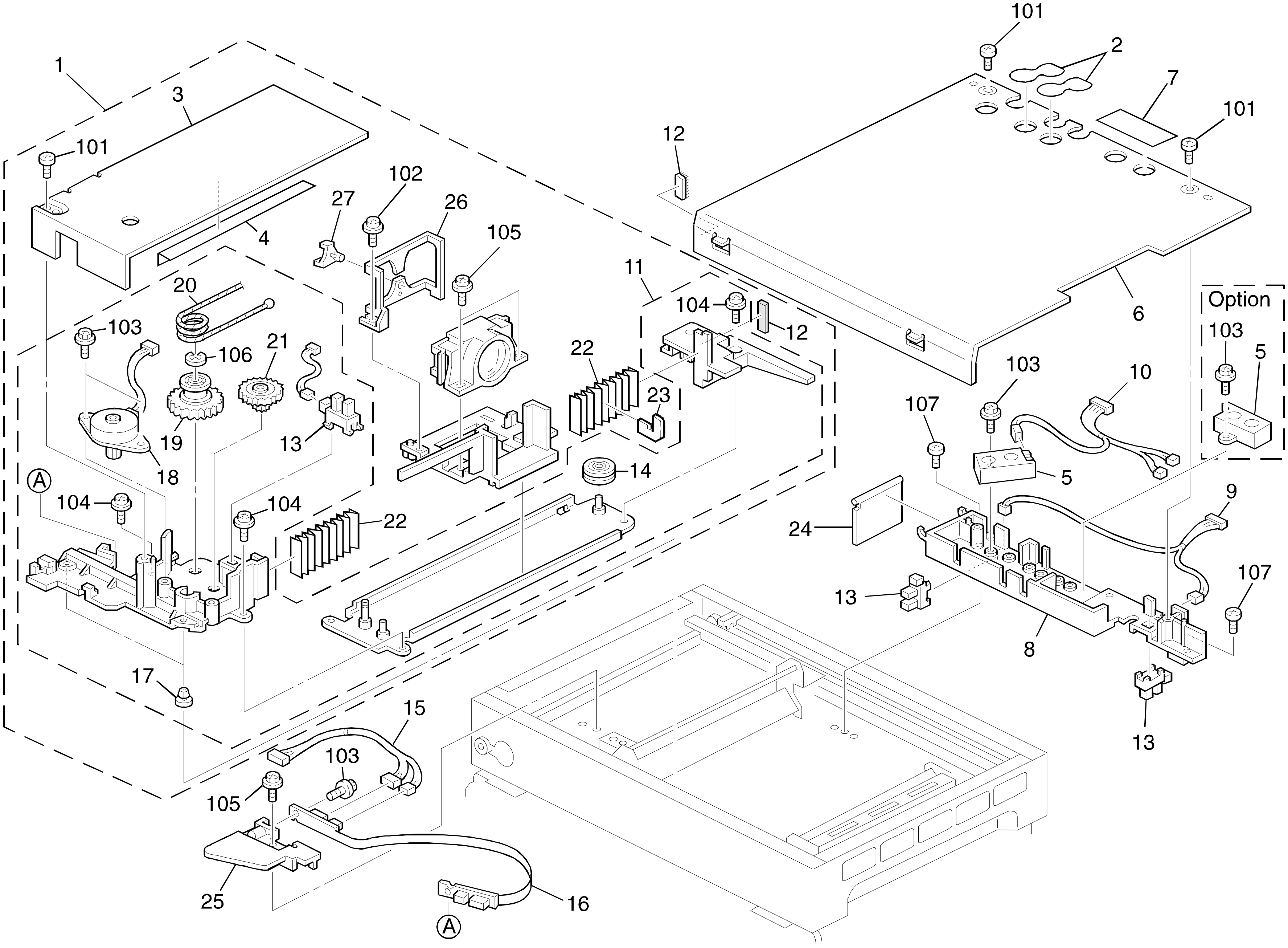

105
102
103
17
104
5
4
108
102
104
1
102
11
9
10
16
15
3
14
12
13
106
19
20
21
18
8
107
6
7
103
102
5
4
106
103
2
101
102
106
104
1
102

10.PAPER REGISTRATION (A212/A214)

Index No.	Part No.	Description	Q'ty Per Assembly
1	AA08 2047	Bushing - 8x16x7	9
2	AG05 0074	Registration Knob	1
3	A212 2563	Lower Registration Guide	1
4	5474 2152	Bushing - 8x12x12mm	2
5	A212 2539	Spring - Registration Roller	2
6	A212 2552	Vertical Relay Guide Plate	1
7	A212 2537	Bushing	1
8	A212 2551	Lower Guide Plate	2
9	A204 2101	P.T.L. Lamp Ass'y	1
10	A153 3114	Transfer Entrance Guide	1
11	A212 2580	Vertical Transfer Hinge (A212)	1
12	AF02 1052	Upper Registration Roller	1
13	AF02 0316	Lower Registration Roller	1
14	A134 2557	Regist Sensor Bracket	1
15	AW02 0068	Photointerruptor	1
16	A212 5333	CT Harness	1
17	A212 2538	Bushing	1
18	A212 2550	Vertical Guide Plate	1
19	A212 2558	Upper Resistration Guide	1
20	AF02 0337	Upper Relay Roller	1
21	AF02 0338	Lower Relay Roller	1

Index No.	Part No.	Description	Q'ty Per Assembly
101	0951 3006B	Philips Screw With Flat Washer - M3x6	
102	0434 0060B	Philips Tapping Screw - M4x6	
103	0720 0040E	Retaining Ring - M4	
104	0720 0060E	Retaining Ring - M6	
105	0443 0050B	Philips Pan Head Screw - M3x6	
106	0313 0040B	Philips Pan Head Screw - M3x4	
107	0414 0080B	Binding Self-tapping Screw - M4x8	
108	0434 0080B	Pan Head Self-tapping Screw - M4x8	

11.OPTICAL SECTION 1 (A212/A214)



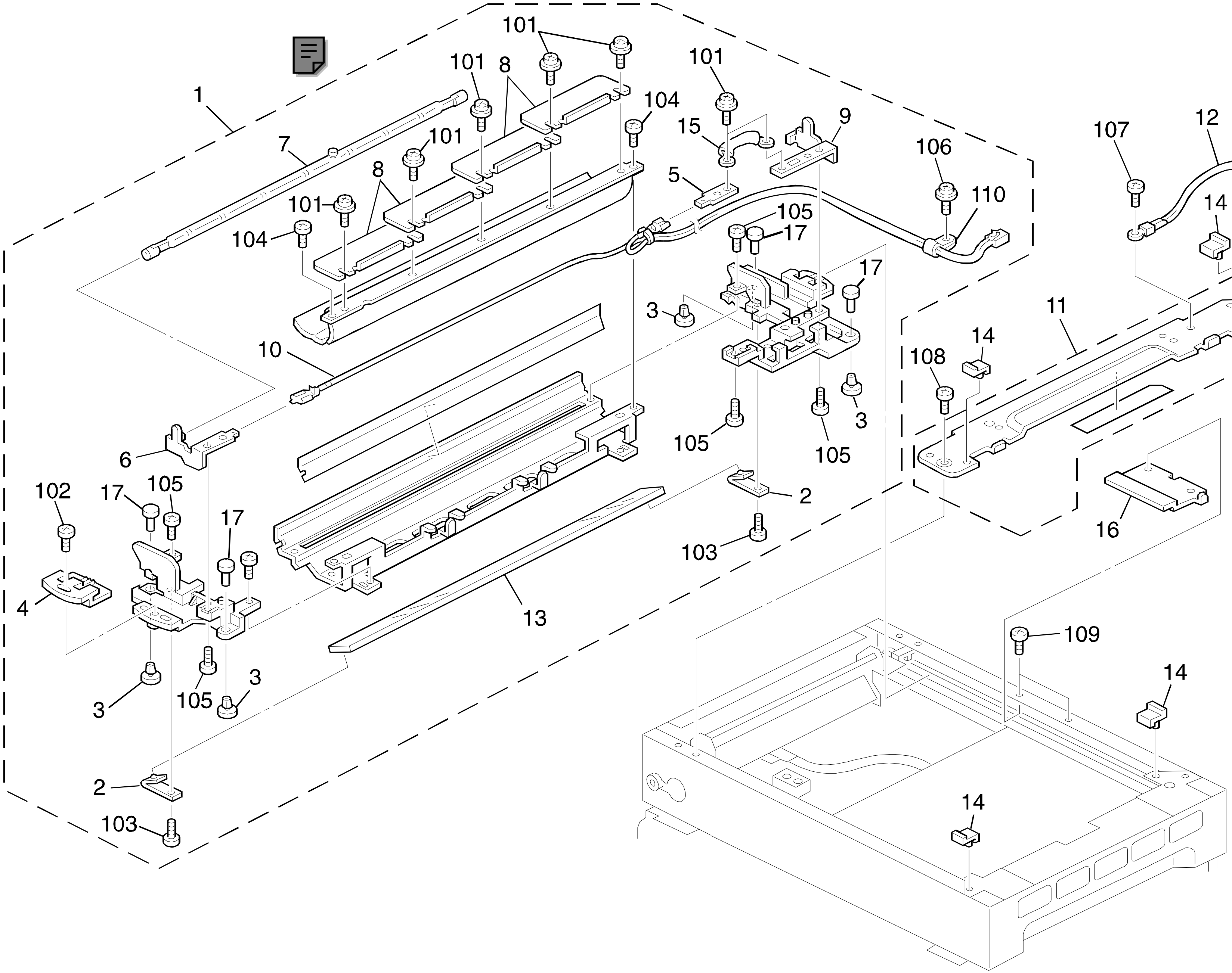
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
101
102
103
104
105
106
107
A
Option

11.OPTICAL SECTION 1 (A212/A214)

Index No.	Part No.	Description	Q'ty Per Assembly
1	A212 1840	Lens Magnification Unit	1
2	AA15 0369	Original Sensor Seal	1
3	A153 1851	Lens Cover	3
4	AA15 0368	Shielding Plate - Cover - Lens	1
5	AW01 0068	Original Length Sensor	2
6	A153 1961	Lens Cover	1
7	A111 1753	Seal - 0.1x18x49	1
8	A153 1971	Original Sensor Bracket	1
9	A153 5391	Optical Harness - 1	1
10	A153 5392	Optical Harness - 2	1
11	A212 1841	Lens Drive Unit	1
12	AA15 2330	Magnification Seal	2
13	AW02 0086	Photointerruptor	15
14	AB03 2059	Driven Pulley	2
15	A153 5395	Optical Harness - 5	1
16	A153 5141	Lens Drive Harness	1
17	A069 1883	Shoe - Scanner	10
18	A153 5212	Lens Drive Motor - Horizontal	1
19	AB01 7360	Gear Pulley	2
20	AA05 0086	Lens Drive Wire - Horizontal	1
21	AB01 7361	Gear - 24Z/56Z	2
22	AA15 0367	Shielding Mylar	2
23	A153 1859	Shielding Sheet Guide	1
24	A153 1974	Original Sensor Bracket	1
25	A153 1861	Bracket - Flexible Board	1
26	A153 1855	Shading Plate	1
27	A153 1854	Wire Guide	1
28	AZ48 0021	Relay Harness - 3P	1

Index No.	Part No.	Description	Q'ty Per Assembly
101	0802 5237	Tapping Screw - M4x10	
102	0413 0062B	Tapping Screw - M3x6	
103	0802 5232	Tapping Screw - M3x8	
104	0951 4006B	Philips Screw With Washer - M4x6	
105	0965 3008W	Tapping Screw With Flat Washer - M3x8	
106	0720 0040E	Retaining Ring - M4	
107	0414 0080B	Tapping Screw - M4x8	

12.OPTICAL SECTION 2 (A212/A214)

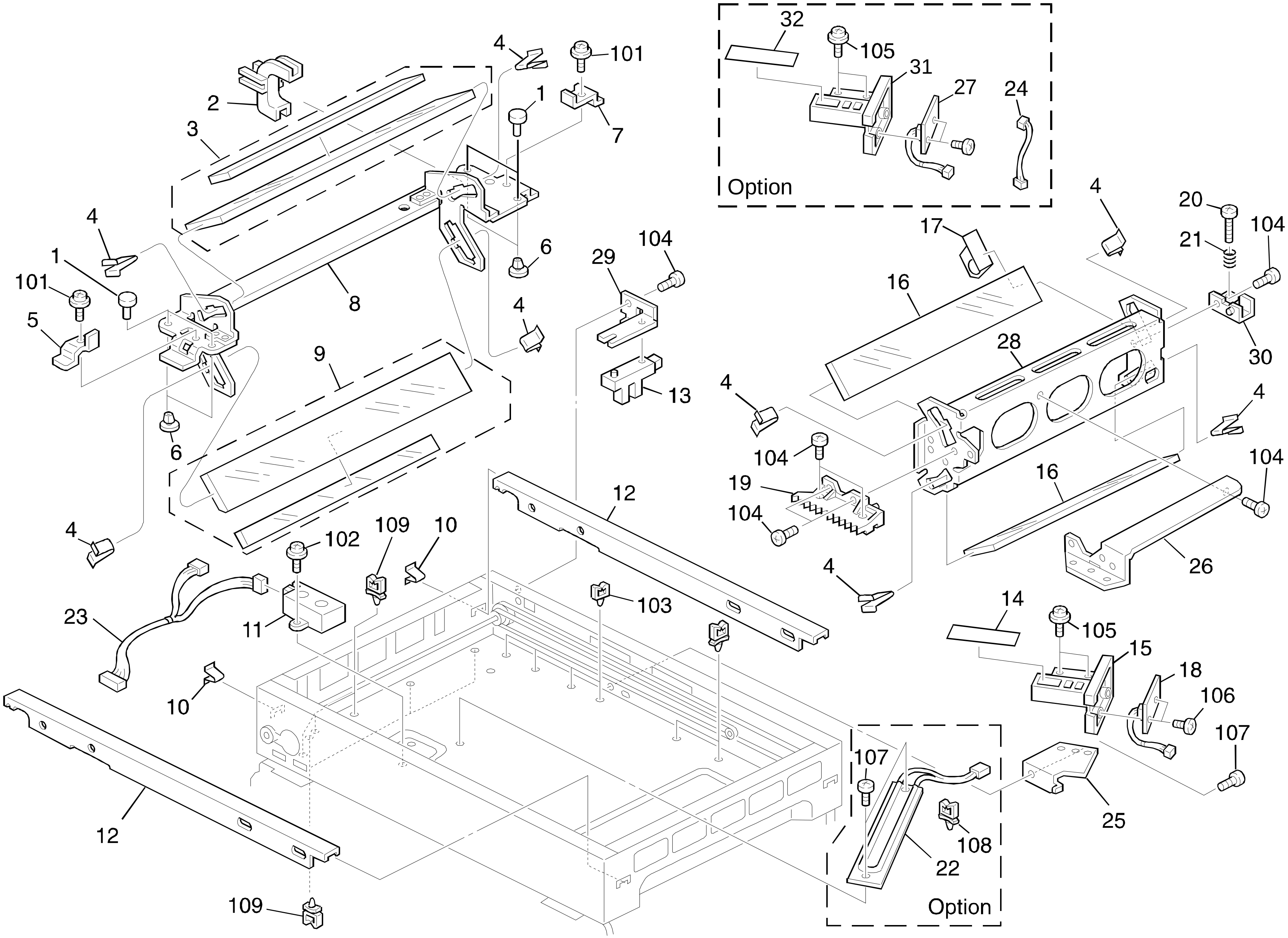

101
101
8
101
104
9
1
15
12
107
7
101
106
8
5
110
101
105
104
17
14
108
17
3
11
14
10
108
3
6
105
105
2
102
17
105
16
17
103
4
13
109
3
14
3
105
14
2
103

12.OPTICAL SECTION 2 (A212/A214)

Index No.	Part No.	Description	Q'ty Per Assembly
1	A157 1790	1st Scanner Ass'y (NA)	1
1	A157 1770	1st Scanner Ass'y (EU/ASIA/TWN)	1
2	AC03 5022	Rear Mirror Clamp - 1st Mirror	2
3	A069 1883	Shoe - Scanner	10
4	A153 1776	Front Mirror Clamp - 1st Mirror	1
5	A077 1673	Thermofuse Terminal	1
6	A153 1777	Front Terminal	1
7	AX52 0028	Exposure Lamp - 97V 200W (NA)	1
7	AX52 0026	Exposure Lamp - 85V 200W (EU/ASIA/TWN)	1
8	A085 1670	Exposure Adjusting Plate	4
9	A153 1778	Rear Terminal	1
10	A153 1780	Exposure Lamp Harness	1
11	A153 1749	Scale Bracket	1
12	AW10 0027	Thermister	1
13	AC03 0103	1st Mirror	1
14	A153 1754	Exposure Stay	4
15	A153 1779	Thermostat - 121°C 250V 10A	1
16	A153 1757	Contact Grass Holder	2
17	A096 1873	Scanner Shoe Pin	4
18	A085 1861	Main Refretor	1

Index No.	Part No.	Description	Q'ty Per Assembly
101	0951 3006B	Philips Screw With Flat Washer - M3x6	
102	0414 0082W	Tapping Screw With Flat Washer - M4x8	
103	0413 0062W	Tapping Screw - M3x6	
104	0413 0050Z	Tapping Screw - M3x5	
105	0413 0060W	Tapping Screw - M3x6	
106	0964 4008W	Tapping Screw With Flat Washer - M4x8	
107	0313 0040B	Philips Pan Head Screw - M3x4	
108	0313 0060B	Philips Pan Head Screw - M3x6	
109	0314 0060B	Philips Pan Head Screw - M4x6	
110	1105 0008	Nylon Clamp - 2n	

13.OPTICAL SECTION 3 (A212/A214)



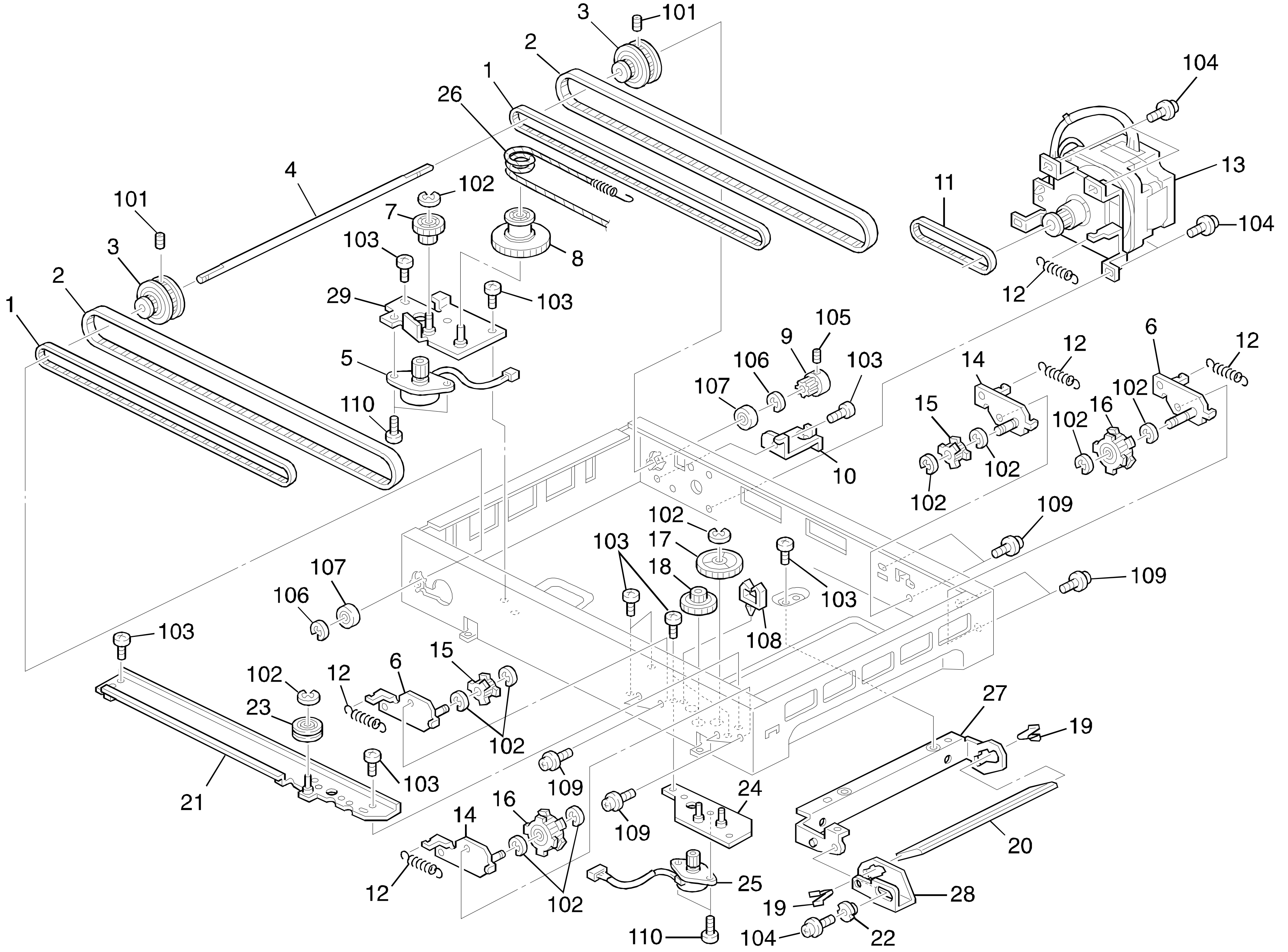
32
105
31
27
24
Option
4
101
1
2
7
3
4
6
1
101
8
5
9
4
6
4
29
104
13
17
16
28
4
20
21
104
30
4
104
19
104
16
104
4
26
12
102
109
10
23
11
103
14
105
15
18
106
107
10
12
107
22
108
25
Option
109

13.OPTICAL SECTION 3 (A212/A214)

Index No.	Part No.	Description	Q'ty Per Assembly
1	A096 1873	Scanner Shoe Pin	8
2	A212 1807	Harness Guide	1
3	A153 1808	2nd Mirror	1
4	A077 1690	Spring Plate - Mirror	10
5	A153 1805	Front Mirror Holder	1
6	A069 1883	Shoe - Scanner	10
7	A153 1806	Rear Mirror Holder	1
8	A153 1801	2nd Scanner Ass'y	1
9	A153 1809	3rd Mirror	1
10	A153 1721	Spring Plate	2
11	AW01 0040	Original Sensor	1
12	A153 1720	Scanner Rail	2
13	AW02 0022	Photointerruptor	2
14	A096 1693	ADS Cover	1
15	A096 1692	ADS Case	1
16	AC03 0106	4/5 Mirror	2
17	A153 1908	Shielding Plate	1
18	A212 5160	ADS Board	1
19	A212 1914	3rd Scanner Rack	1
20	A153 1906	Adjust Shoe	1
21	AA06 3523	Adjust Spring	1
22	AX40 0047	Anticondensation Heater - 115V 15W (Option)	1
22	AX40 0048	Anticondensation Heater - 240V 15W (Option)	1
23	A212 5393	Optical Harness 3	1
24	A153 9513	Harness - ADS (Option)	1
25	A153 1976	ADS Sensor Bracket	1
26	A153 1912	3rd Scanner Stay	1
27	A096 5230	ADS Board (Option)	1
28	A212 1903	3rd Scanner Bracket	1
29	A212 1981	Scaner Home Sensor Bracket	1
30	A153 1905	3rd Scanner Filler	1
31	A096 1692	ADS Case (Option)	1
32	A096 1693	ADS Cover (Option)	1

Index No.	Part No.	Description	Q'ty Per Assembly
101	0960 4005B	Philips Flange Screw - M4 X 5	
102	0443 0080W	Hexagon Head Tapping Screw - M3x8	
103	1105 0230	Clamp	
104	0414 0080B	Tapping Screw - M4x8	
105	0951 3005B	Philips Screw With Flat Washer M3x5	
106	0802 5231	Tapping Screw - M3x6	
107	0434 0060B	Philips Tapping Screw - M4x6	
108	1105 0231	Clamp	
109	1105 0229	Clamp	

14.OPTICAL SECTION 4 (A212/A214)

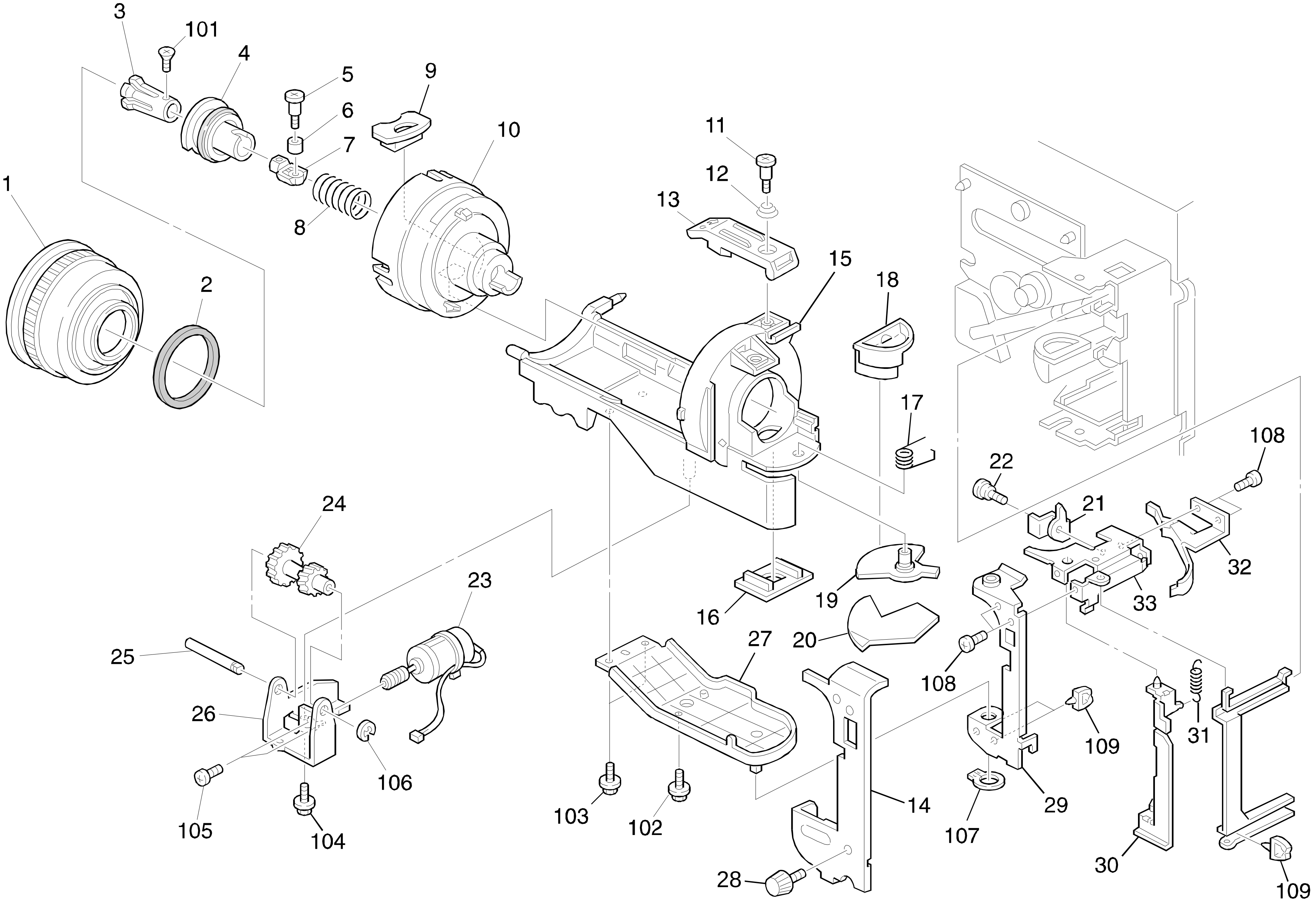

3
101
2
1
26
104
4
102
13
101
7
11
104
103
8
3
2
29
103
12
1
105
9
106
103
12
6
12
5
107
14
102
15
16
110
102
10
102
102
109
102
17
103
18
103
109
107
106
108
103
102
12
6
15
27
23
19
102
103
109
24
21
16
14
20
109
25
12
102
28
19
110
104
22

14.OPTICAL SECTION 4 (A212/A214)

Index No.	Part No.	Description	Q'ty Per Assembly
1	AA04 3387	Timing Belt - 40S2M984	2
2	AA04 3386	Timing Belt - 40S2M1224	2
3	AB03 3069	Timing Pulley - 22Z/24Z	2
4	AA14 0599	Scanner Drive Shaft	1
5	A153 5213	Lens Drive Motor - DC24V 8.6W	1
6	A212 1708	Tension Bracket - Short	2
7	AB01 7362	Gear - 25Z/32Z	1
8	AB01 7360	Gear Pulley	2
9	AB03 0486	Timing Pulley - 24Z	1
10	A153 5803	Upper Bracket - DC Drive Board	1
11	AA04 3388	Timing Belt - 60S2M180	1
12	A212 1695	Tension Spring	5
13	A153 1700	Scanner Drive Motor - DC2.3V 13.5W	1
14	A212 1707	Tension Bracket - Long	2
15	AB03 0489	Timing Pulley - 22Z	2
16	A212 1710	Timing Pulley - 44Z	2
17	AB01 7129	Gear - 20Z And 72Z	1
18	AB01 7361	Gear - 24Z/56Z	2
19	A077 1690	Spring Plate - Mirror	10
20	AC03 0107	6th Mirror	1
21	A153 1952	Magnification Rail	1
22	A075 1766	Adjusting Cam	1
23	AB03 2059	Driven Pulley	2
24	A153 1947	Magnification Drive Unit Barcket	1
25	A153 5211	Mirror Drive Motor - DC24V 8.6V	1
26	AA05 0087	Lens Drive Wire - Vertical	1
27	A153 1923	6th Mirror Bracket	1
28	A153 1924	6th Mirror Plate	1
29	A153 1935	Lens Drive Bracket	1

Index No.	Part No.	Description	Q'ty Per Assembly
101	0573 0040E	Hexagon Headless Set Screw - M3x4	
102	0720 0040E	Retaining Ring - M4	
103	0434 0060B	Philips Tapping Screw - M4x6	
104	0951 4008B	Philips Screw With Washer - M4x8	
105	0574 0050E	Hexagon Headless Set Screw - M4x5	
106	0720 0060E	Retaining Ring - M6	
107	0740 3008	Ball Bearing - 8x22x7	
108	1105 0230	Clamp	
109	0951 4006B	Philips Screw With Washer - M4x6	
110	0433 0060W	Tapping Screw - M3x6	
111	0573 0100E	Hexagon Headless Set Screw - M3x10	

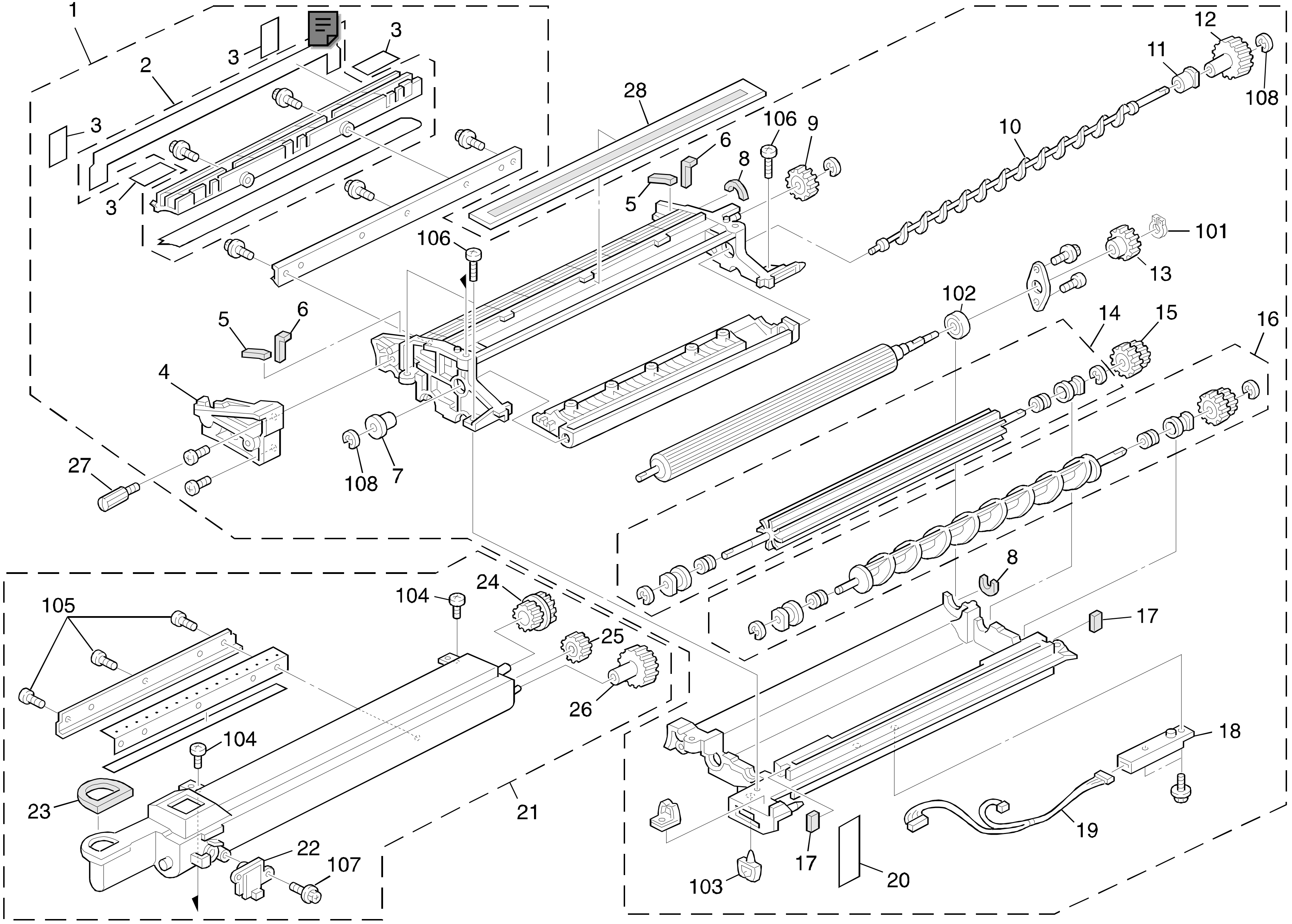
15.TONER SUPPLY UNIT (A212/A214)


3
101
4
5
9
6
7
10
1
8
11
12
13
15
18
2
17
22
108
21
32
24
33
23
19
16
27
20
25
108
26
109
31
106
105
104
103
102
14
29
107
30
28
109

15.TONER SUPPLY UNIT (A212/A214)

Index No.	Part No.	Description	Q'ty Per Assembly
*	A212 3151	Toner Supply Unit (RIC-NA)	1
*	A212 3150	Toner Supply Unit (RIC-EU)	1
*	A212 3153	Toner Supply Unit (OEM/RIC-AA)	1
1	A212 3187	Toner Supply Gear (RIC-NA)	1
1	A212 3185	Toner Supply Gear (RIC-EU)	1
1	A212 3189	Toner Supply Gear (OEM/RIC-AA)	1
2	AA15 1894	Seal - 67x53x2	1
3	A134 3180	Bottle Chuck	1
4	A212 3177	Toner Slider	1
5	AA14 3712	Chuck Shaft	1
6	A134 3181	Chuck Roller	1
7	A212 3179	Chuck Shaft	1
8	A212 3073	Chuck Spring	1
9	A134 3215	Ruber Cap	1
10	A212 3190	Toner Bottle Stopper	1
11	AA14 3410	Stepped Screw - M4	1
12	AA06 3367	Pressure Spring	1
13	A212 3197	Bottle Holder	1
14	A212 3281	Bottle Bracket Cover	1
15	A212 3068	Toner Bottle Holder	1
16	A212 3173	Shutter Guide	1
17	A212 3078	Shutter Spring	1
18	A212 3174	Shutter Holder	1
19	A212 3172	Shutter	1
20	AA15 0377	Shutter Seal	1
21	A153 3265	Bottle Unit Lock Plate	1
22	AA14 3025	Stepped Screw - M3	1
23	A134 3162	Bottle Drive Motor	1
24	AB01 7347	Idle Gear	1
25	AA14 8413	Idle Gear Shaft	1
26	A134 3161	Bottle Drive Bracket	1
27	A212 3157	Bottole Holder Bracket	1
28	AA14 3459	Knob Serew	1
29	A153 3262	Bottle Unit Hinge	1
30	A153 3266	Bottle Unit Link Plate	1
31	A212 3072	Relay Adjusting Spring	2
32	A134 3201	Cam - Toner Bottle	1
33	A153 3264	Bottle Unit Upper Hinge	1
101	0323 0060B	Philips Sunk Screw - M3x6	
102	0433 0050B	Tapping Screw - M3[illegible]	
103	0802 5231	Tapping Screw - M[illegible]	
104	0802 5233	Tapping Screw - M[illegible]10	
105	0800 0072	Philips Pan Head Screw - M2.6x4	
106	0720 0040E	Retaining Ring - M4	
107	0725 0100E	Retaining Ring C - M10	
108	0434 0060B	Philips Tapping Screw - M4x6	
109	1105 0199	Clamp	

16.DEVELOPMENT UNIT (A212/A214)

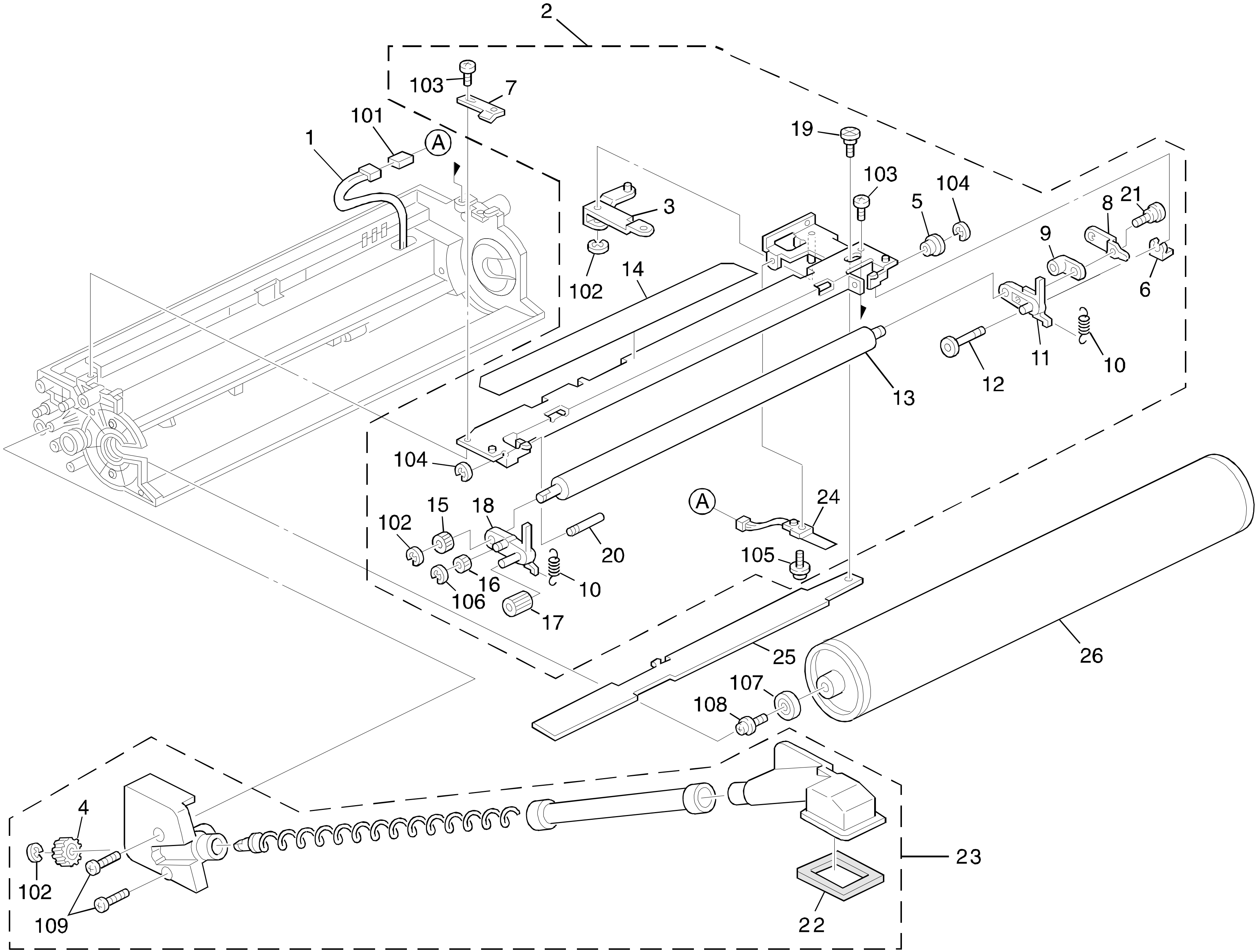

1
3
1
3
2
28
12
11
108
3
106
9
6
10
8
3
5
106
101
13
102
5
6
14
15
16
4
27
108
7
8
104
24
105
25
17
26
18
104
23
21
19
22
107
17
103
20

16.DEVELOPMENT UNIT (A212/A214)

Index No.	Part No.	Description	Q'ty Per Assembly
1	A212 3051	Development Unit	1
2	A153 3075	Entrance Seal	1
3	AA15 0382	Entrance Seal	1
4	A212 3090	Development Position Plate	1
5	AA15 1940	Left Upper Seal	1
6	AA15 1144	Shield - Guide Plate	1
7	AA08 0188	Bushing - 5mm	1
8	AA15 2136	Shield - Development Roller	1
9	AB01 3909	Idle Gear	1
10	A212 3079	Toner Collection Coil	1
11	AA08 0186	Bushing - 6mm	1
12	AB01 3911	Gear	1
13	AB01 3343	Gear - 22Z	1
14	A212 3063	Paddle Roller	1
15	AB01 7366	Paddle Gear	1
16	A153 3065	Right Paddle Roller	1
17	AA15 1941	Right Shield - Development Case	1
18	AW23 0008	ID Sensor	1
19	A153 5330	CT Harness - 7p	1
20	G012 3897	Relay Harness - Toner End Sensor	1
21	A212 3200	Toner Hopper Ass'y	1
22	AW23 0009	Toner End Sensor	1
23	AA15 1935	Seal - 38x32x2.5	1
24	A212 3057	Gear - 17Z	1
25	A212 3056	Coupled Gear - 15z/22z	1
26	A212 3058	Gear - 26Z	1
27	A153 3149	Knob Screw - M4x12	1
28	A204 3080	Development Filter	1

Index No.	Part No.	Description	Q'ty Per Assembly
101	0727 0090E	Retaining Ring C - M9	
102	0805 3415	Ball Bearing - 9x20x6	
103	1105 0199	Clamp	
104	0314 0060B	Philips Pan Head Screw - M4x6	
105	0802 5231	Binding Self-tapping Screw - M3x6	
106	0802 5238	Tapping Screw - M4x12	
107	0452 3010B	Tapping Bind Screw - M3x10	
108	0720 0040E	Retaining Ring - M4	

17.DRUM UNIT 1 (A212/A214)

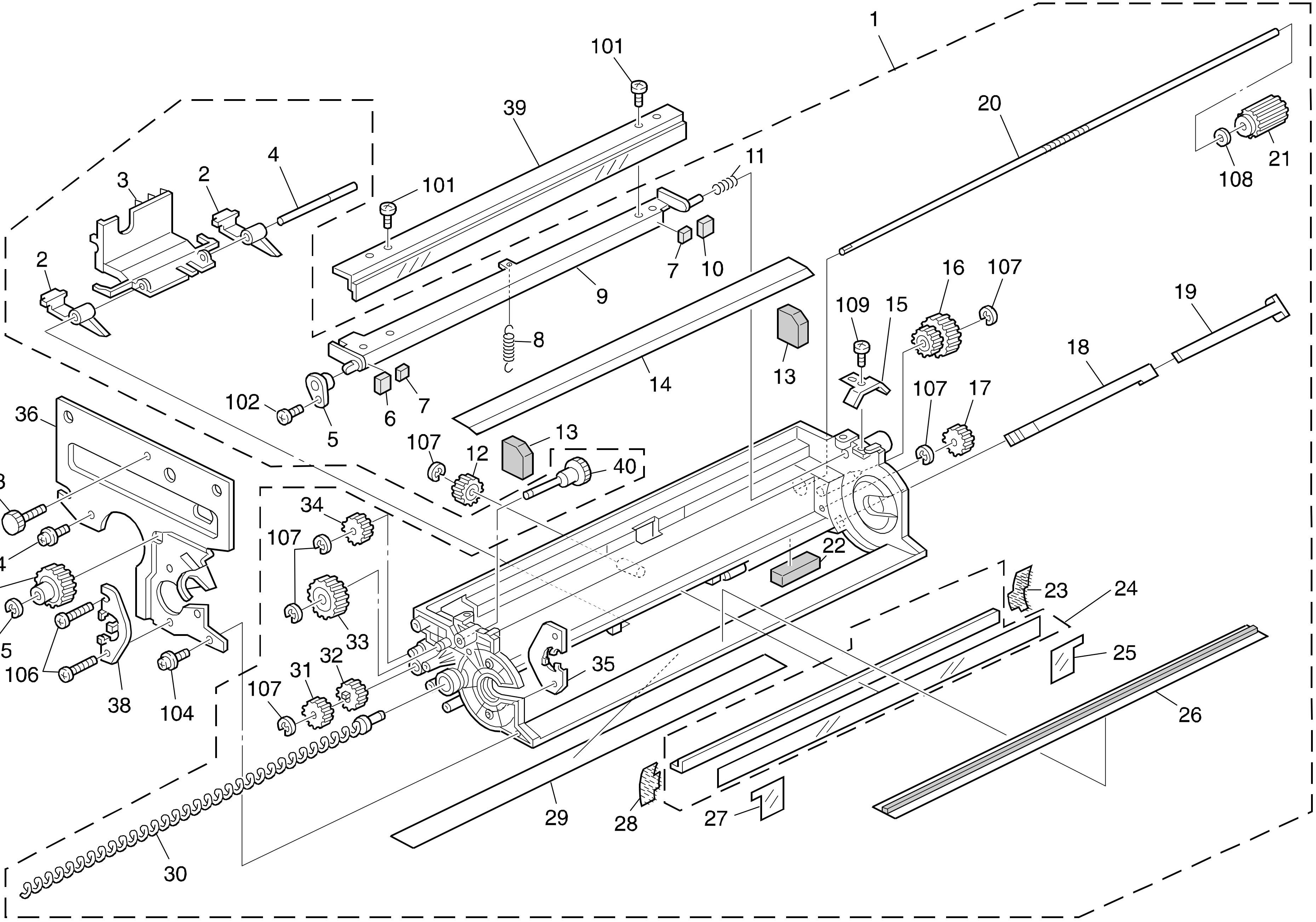

2
103
7
101
1
A
19
103
104
3
5
8
21
9
102
14
6
11
10
12
13
104
A
24
15
18
102
20
105
10
16
106
17
25
26
107
108
4
102
109
23
22

17.DRUM UNIT 1 (A212/A214)

Index No.	Part No.	Description	Q'ty Per Assembly
1	AZ48 0029	CT Harness	1
2	A212 2110	Charge Roller Ass'y	1
3	A153 2126	Swing Arm	1
4	AB01 1358	Driven Gear	1
5	A212 2351	Rear Roller Bushing	1
6	A077 1310	Snap Ring - M2	1
7	A153 2116	Grounding Plate	1
8	**A153 2135**	**Charge Roller Terminal Ass'y**	**1**
9	AA08 0197	Rear Roller Bushing	1
10	A212 2252	Pressure Roller Spring	2
11	A212 2352	Rear Roller Housing	1
12	AA14 5808	Rear Support Shaft	1
13	**AD02 7004**	**Charge Roller**	**1**
14	A153 2143	Shielding Plate	1
15	AB01 0348	Gear - 20Z	1
16	A212 2131	Idle Gear 14z	1
17	A212 2132	Idle Gear 20z	1
18	A212 2353	Gront Roller Bushint	1
19	AA14 3744	Stepped Screw	1
20	AA14 5794	Front Support Shaft	1
21	AA14 3730	Stepped Screw	1
22	AA15 1945	Joint Seal	1
23	A212 3580	Toner Collection Unit	1
24	AW10 0032	Thermistor - 25°C 10k Ω	1
25	**A204 2120**	**Drum Charge Roller Cleaner**	**1**
26	A153 9510	OPC Drum	1

Index No.	Part No.	Description	Q'ty Per Assembly
101	1102 6613	Relay Terminal - 2P	
102	0720 0040E	Retaining Ring - M4	
103	0313 0060B	Philips Pan Head Screw - M3x6	
104	0720 0015E	Retaining Ring - 1.5	
105	0951 3008B	Philips Screw With Flat Washer - M3x8	
106	0720 0020E	Retaining Ring - M2	
107	0805 3471	Bushing - M8x22x7	
108	0951 5010B	Philips Screw With Washer - M5x10	
109	0802 5233	Tapping Screw - M3x10	

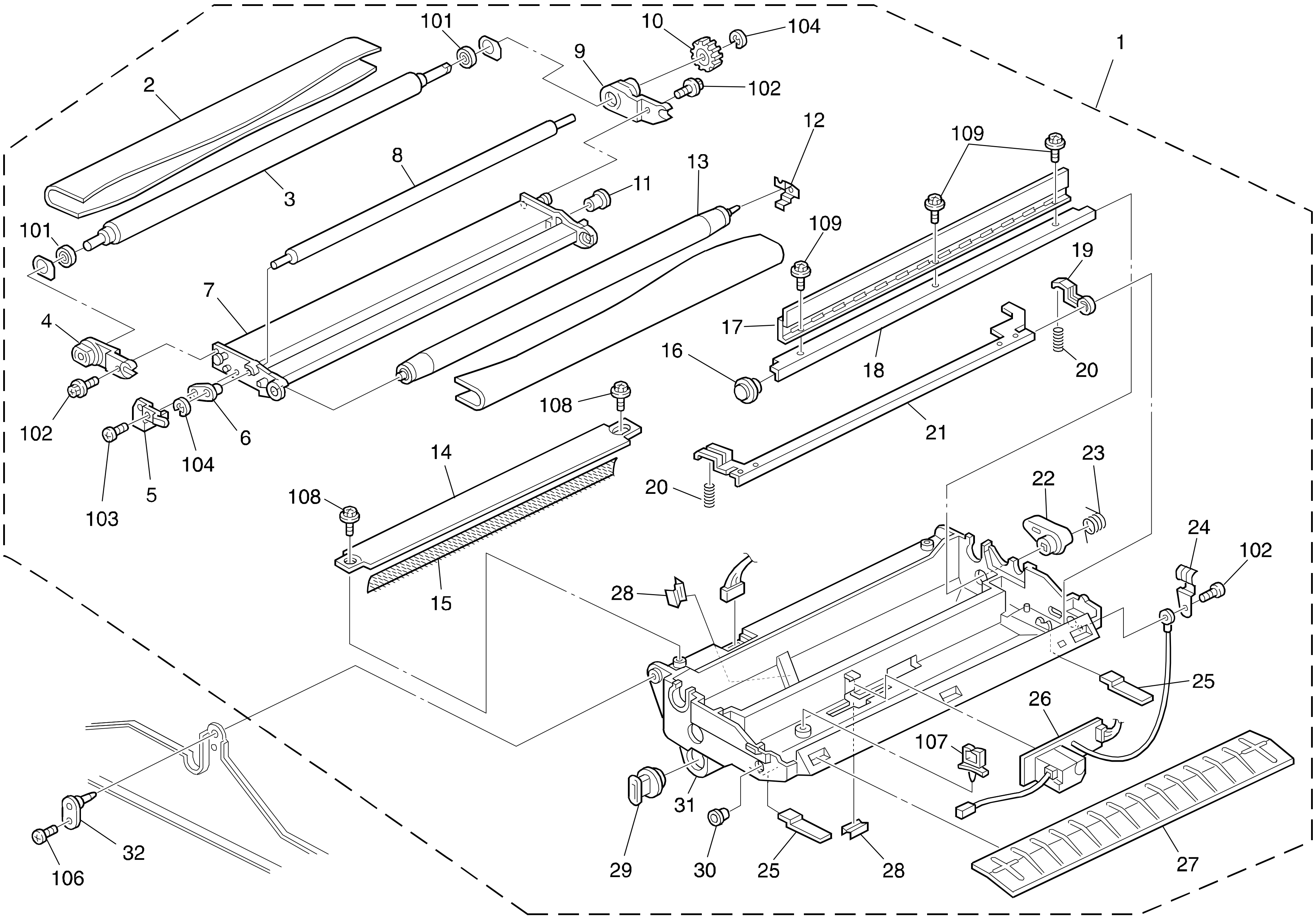
18.DRUM UNIT 2 (A212/A214)


1
101
39
20
21
108
3
2
4
101
11
2
7
10
9
16
107
109
15
19
8
13
18
14
36
102
6
7
107
17
5
107
12
13
40
103
34
107
22
104
23
24
37
33
105
35
25
106
38
104
32
31
107
26
29
28
27
30

18.DRUM UNIT 2 (A212/A214)

Index No.	Part No.	Description	Q'ty Per Assembly
1	A212 2255	Drum Unit	1
2	**AD02 5019**	**Drum Pick-off Pawl**	**1**
3	A212 3595	Pick-off Pawl Retainer	1
4	AA14 0321	Pick-off Pawl Shaft	1
5	A204 3568	Rear Bushing	1
6	AA15 1943	Front Seal	1
7	AA15 1809	Rear Seal	1
8	A212 2251	Pressure Blade Spring	1
9	A153 3561	Cleaning Blade Bracket	1
10	AA15 1944	Rear Seal	1
11	A212 2354	Pad Pressure Spring	1
12	AB01 7376	Separation Pawl Ca	1
13	AA15 1942	Side Seal	1
14	A153 3558	Blade Seal	1
15	A153 3570	Spring Plate	1
16	AB01 7373	Idle Cam	1
17	AB01 1357	Collection Coil Gear	1
18	A212 5132	Density Sensor	1
19	A212 3590	ADS Plate	1
20	AA14 0560	Joint Shaft	1
21	AB01 1359	Joint Drive Gear	1
22	AA16 1107	Cushion	1
23	AA15 2246	Rear Drum Seal	1
24	A153 3555	Cleaning Entrance Seal	1
25	AA15 0381	Seal Rear Holder	1
26	AA15 0389	Drum Guide Seal	1
27	AA15 0380	Seal Front Holder	1
28	AA15 2245	Front Drum Seal	1
29	A153 3591	Mylar - 17x335	1
30	AD04 3035	Toner Collection Coil	1
31	AB01 7375	Drive Gear	1
32	AB01 7374	Drive Gear	1
33	AB01 7388	Blade Cam	1
34	AB01 1360	Idle Gear	1
35	A153 2303	Grounding Plate	1
36	A153 2301	Front Stay	1
37	AB01 1361	Drive Gear	1
38	A153 2302	Drum Bearing Holder	1
39	**A153 2277**	**Cleaning Blade**	**1**
40	AB01 0341	Gear - 18Z	1
101	0314 0060B	Philips Pan Head Screw - M4x6	
102	0802 5233	Binding Self-tapping Screw - M3x10	
103	0803 0017	Knob Screw - M4x6.5	
104	0965 3010B	Tapping Screw - M3X10	
105	0720 0030E	Retaining Ring - M3	
106	0313 0080B	Philips Pan Head Screw - M3x8	
107	0720 0040E	Retaining Ring - M4	
108	0805 3384	Bushing - 5mm	
109	0971 3006A	Philips Polycarbonate Screw - M3x6	

19.TRANSFER UNIT (A212/A214)

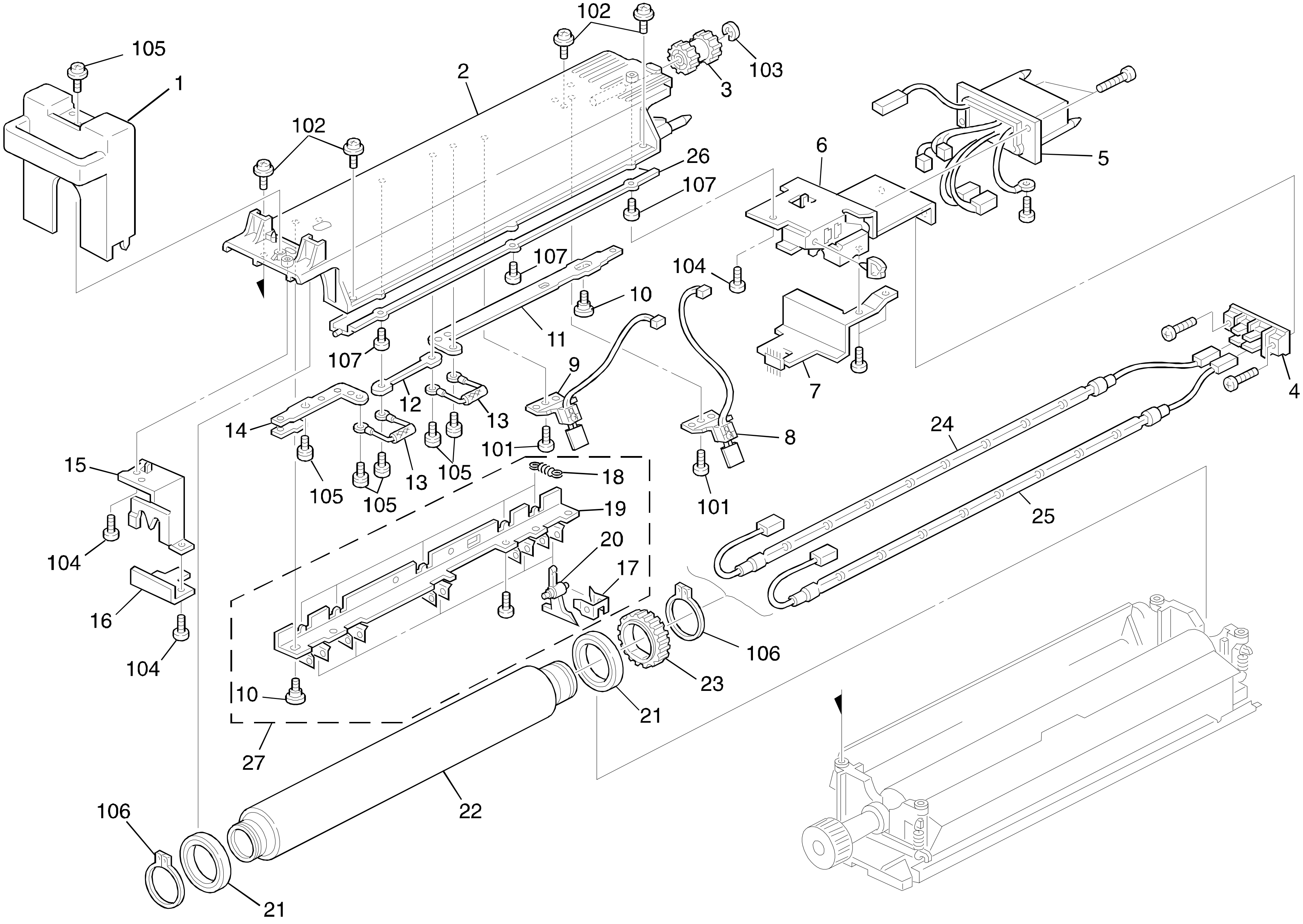

101
10
104
1
9
102
2
3
12
109
8
13
11
109
101
19
7
17
4
16
18
20
108
102
6
21
104
14
23
103
5
20
22
108
24
102
28
15
25
26
107
31
32
29
30
25
28
27
106

19.TRANSFER UNIT (A212/A214)

Index No.	Part No.	Description	Q'ty Per Assembly
1	A212 3850	Transfer Unit	1
2	**A157 3861**	**Transfer Belt**	**1**
3	A153 3866	Belt Drive Roller	1
4	A212 3863	Front Side Plate	1
5	A153 3873	Bias Roller Terminal	1
6	AA08 2061	Bias Roller Bushing - Front	1
7	A212 3862	Transfer Belt Frame	1
8	A153 3870	Transfer Bias Roller	1
9	A212 3876	Rear Side Plate	1
10	A212 3865	Belt Drive Gear - 25z	1
11	A212 3853	Bias Roller Bushing - Rear	1
12	A153 3874	Earth Terminal	1
13	A153 3865	Belt Drive Roller	1
14	A212 3884	Belt Guide Plate	1
15	AA15 2332	Seal - 9x351	1
16	A212 3894	Bushing	1
17	**A153 3892**	**Belt Cleaning Blade**	**1**
18	A153 3893	Belt Cleaning Stay	1
19	A212 3886	Belt Pressure Lever	1
20	A212 3851	Spring - T/S Unit	1
21	A212 3887	Belt Release Stay	1
22	A212 3895	Bushing	1
23	AA06 6247	Spring	1
24	A153 3888	Earth Plate	1
25	A153 3877	Spring Plate	1
26	AZ30 0041	Power Pack - Transfer Unit	1
27	A212 3901	Entrance Guide Plate	1
28	A153 3897	Harness Clamp	1
29	A212 3883	Toner Collection Cap	1
30	A212 3888	Earth Plate	1
31	A212 3882	Transfer Belt Casing	1
32	A157 3900	Support Plate	1

Index No.	Part No.	Description	Q'ty Per Assembly
101	0805 3485	Bushing - 8x12x3.5mm	
102	0443 0080B	Tapping Screw - M3x8	
103	0802 5232	Binding Self-tapping Screw - M3x8	
104	0720 0030E	Retaining Ring - M3	
105	0805 3490	Bushing - 5x10x4 mm	
106	0414 0080B	Binding Self-tapping Screw - M4x8	
107	1105 0196	Wire Clamp	
108	0965 3008B	Tapping Screw With Washer - M3x8	
109	0443 0060B	Hexagon Tapping Screw - M3x6	

20.FUSING UNIT 1 (A212/A214)

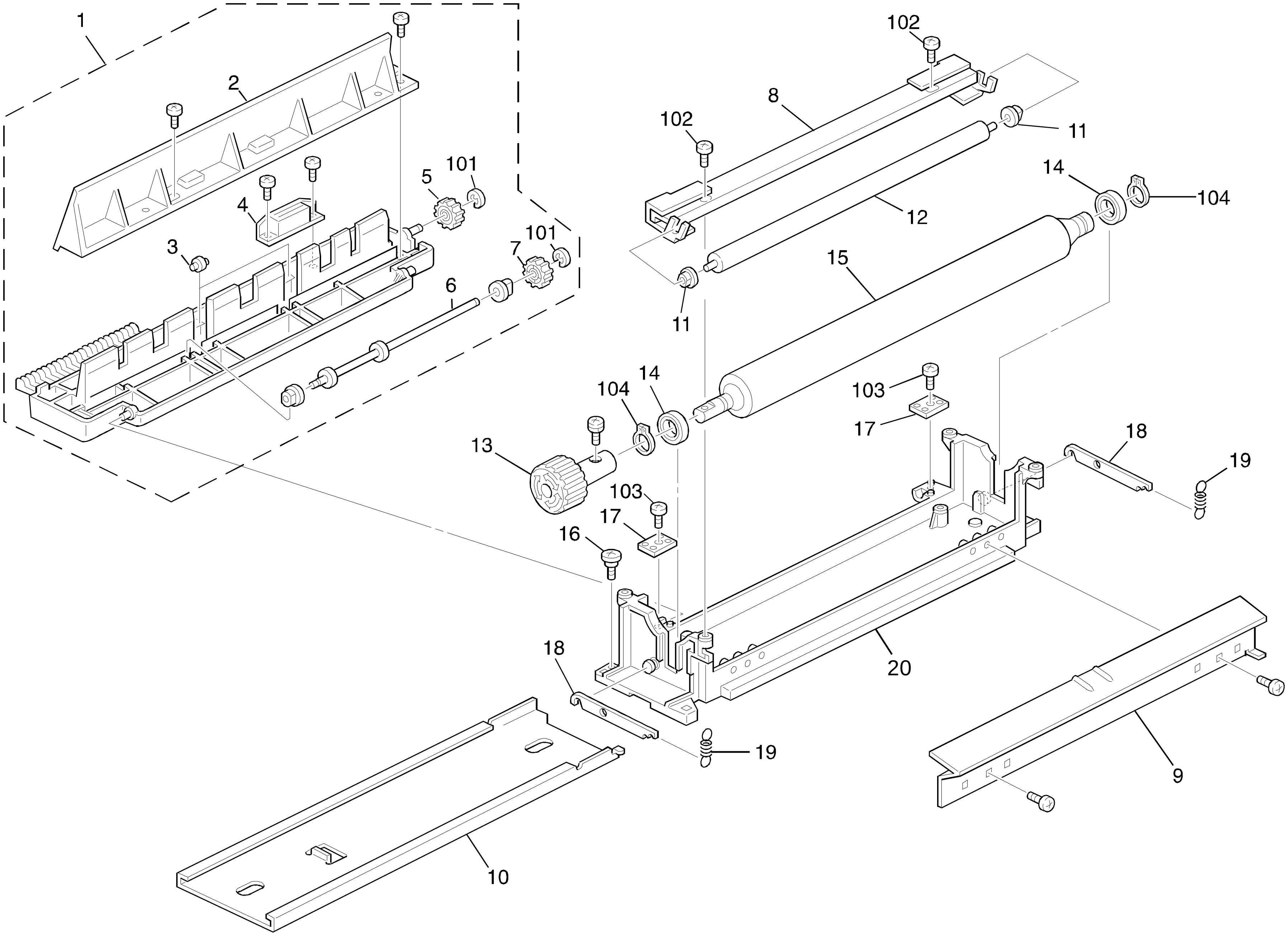

102
105
1
2
3
103
102
26
6
5
107
107
104
10
11
107
9
12
13
7
4
14
24
8
101
105
101
18
15
105
13
105
19
25
20
104
17
16
106
23
104
10
21
27
22
106
21

20.FUSING UNIT 1 (A212/A214)

Index No.	Part No.	Description	Q'ty Per Assembly
*	A212 4005	Fusing Unit (NA)	1
*	A212 4007	Fusing Unit (EU/ASIA/TWN)	1
1	A212 4130	Fusing Front Cover	1
2	A212 4053	Fusing Upper Stay	1
3	AB01 3883	Idle Gear - 25Z	1
4	A153 4074	Terminal Connector - 2p	1
5	A204 5300	Fusing Unit Connector - 115V	1
5	A204 5665	Fusing Unit Connector - 230V	1
6	A208 4084	Fusing Connector Bracket	1
7	A208 4102	Rear Lamp Terminal Holder	1
8	A153 4089	Thermister - 2	1
9	A153 4088	Thermister	1
10	AA14 3715	Stepped Screw - M5	2
11	A134 4061	Rear Terminal Plate	1
12	A153 4062	Electrode Plate - Middle	1
13	A153 5266	Thermofuse - 169°c	2
14	A153 4063	Front Terminal Plate	1
15	A153 4075	Front Holder	1
16	A153 4102	Front Lamp Terminal Holder	1
17	A153 4114	Stripper Stopper	5
18	A212 4103	Solenoid Spring	5
19	A153 4112	Stripper Bracket	1
20	**AE04 4019**	**Hot Roller Stripper**	**5**
21	AE03 0023	Bearing - 30x42x7mm	2
22	**AE01 1024**	**Hot Roller**	**1**
23	AB01 3882	Gear - 40Z	1
24	AX43 0023	Fusing Lamp - 120V 350W	1
24	AX43 0025	Fusing Lamp - 230V 350W	1
25	AX43 0030	Main Fusing Lamp - 120V 550W	1
25	AX43 0031	Main Fusing Lamp - 230V 550W	1
26	A153 4055	Upper Fusing Guide	1
27	A212 4110	Fuser Stripper Ass'y	1

Index No.	Part No.	Description	Q'ty Per Assembly
101	0954 3010B	Philips Screw - M3x10	
102	0954 4012B	Double Sems Screw - M4 X 12	
103	0720 0060E	Retaining Ring - M6	
104	0314 0060B	Philips Pan Head Screw - M4x6	
105	0950 4006M	Philips Screw With Flat Washer - M4x6	
106	0725 0300E	Retaining Ring C - M30	
107	0313 0050B	Philips Pan Head Screw - M3X5	

21.FUSING UNIT 2 (A212/A214)

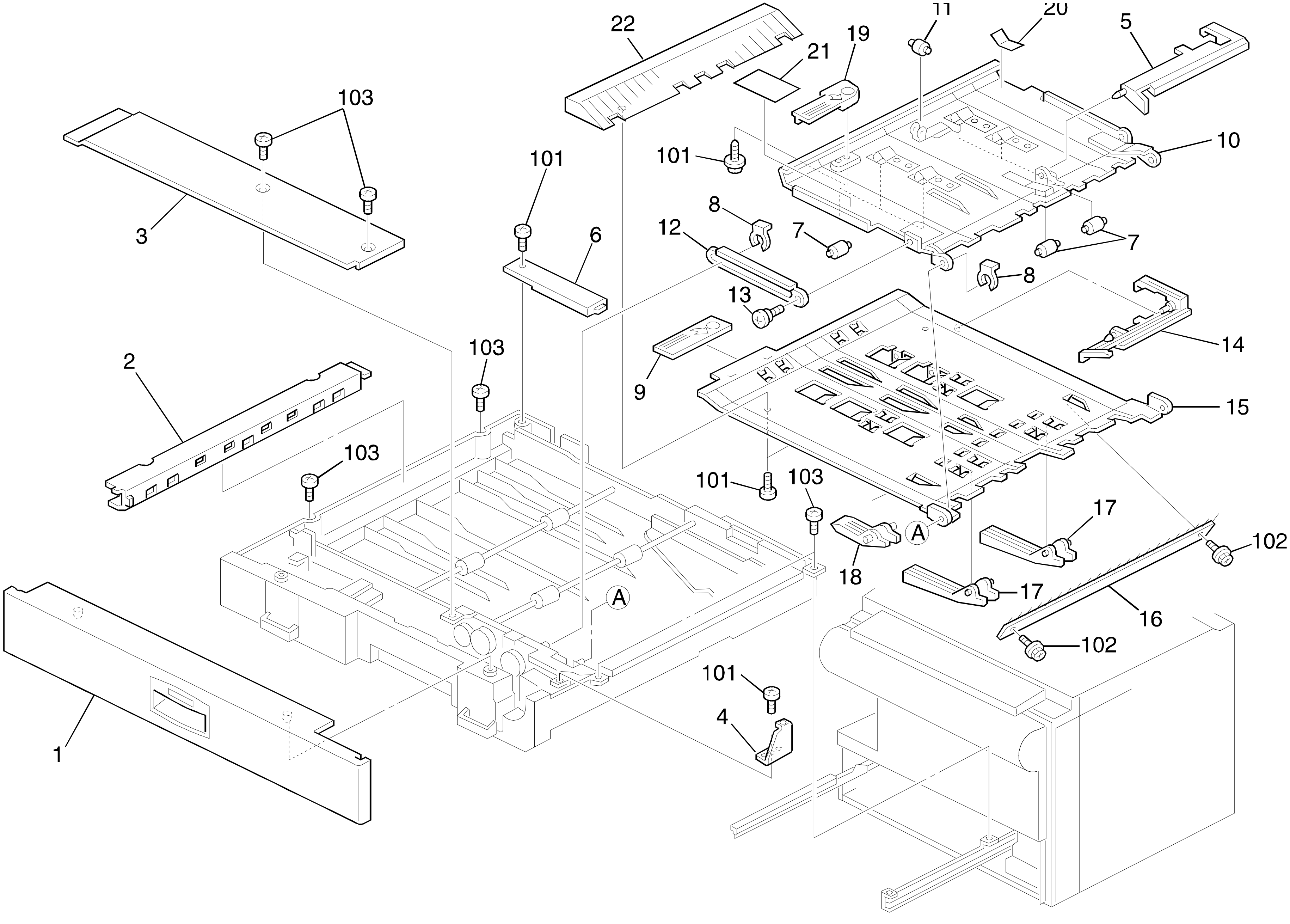

1
2
3
4
5
101
7
101
6
102
8
102
11
12
14
104
15
11
104
14
103
17
13
103
17
16
18
19
20
18
19
9
10

21.FUSING UNIT 2 (A212/A214)

Index No.	Part No.	Description	Q'ty Per Assembly
1	A212 4006	Fusing Exit Unit	1
2	A134 4280	Fusing Exit Guide - Lower	1
3	AF04 0548	Exit Driven Roller	1
4	AG07 0009	Magnetic Catch	1
5	AB01 3885	Idle Gear - 20z	1
6	A212 4326	Exit Roller Ass'y	1
7	AB01 3884	Exit Gear - 17z	1
8	A212 4205	Cleaning Roller Bracket	1
9	A153 4197	Lower Fusing Guide	1
10	A134 4153	Slide Rail - Fusing	1
11	AE03 1028	Bushing - 4mm	1
12	**AE04 2030**	**Cleaning Roller**	**1**
13	AG05 0076	Fusing Knob	1
14	AE03 0022	Bearing - 12x24x64m	1
15	**AE02 0050**	**Pressure Roller**	**1**
16	A077 4162	Shoulder Screw - M3	1
17	A212 4301	Exit Plate	1
18	A134 4161	Pressure Lever	1
19	A212 4459	Pressure Spring	1
20	A212 4151	Fusing Unit Frame	1

Index No.	Part No.	Description	Q'ty Per Assembly
101	0720 0040E	Retaining Ring - M4	
102	0414 0122B	Philips Tapping Screw - M4x12	
103	0434 0082B	Tapping Screw - M4x8	
104	0725 0120E	Retaining Ring C - M12	

22.DUPLEX TRAY 1 (A214)

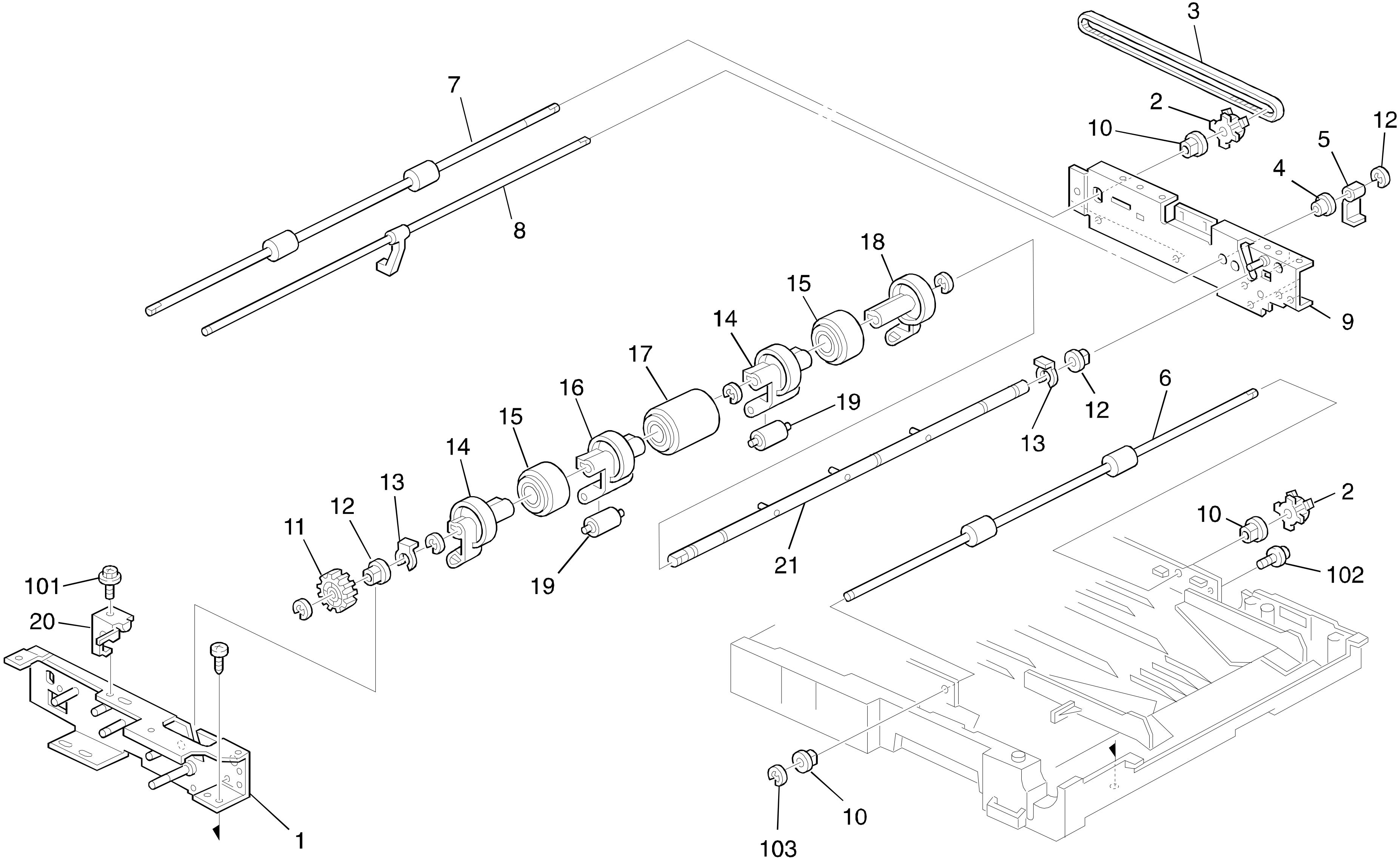

22
11
20
19
21
5
103
101
101
10
3
8
12
7
7
6
8
13
103
14
2
9
15
103
101
103
17
102
A
18
17
A
16
102
101
4
1

22.DUPLEX TRAY 1 (A214)

Index No.	Part No.	Description	Q'ty Per Assembly
1	A134 2956	Paper Feed Front Cover	2
2	A134 4720	End Fence Upper Cover	1
3	A134 4701	Front Upper Cover	1
4	A134 4712	Right Cover Bracket	1
5	A134 4728	Inverter Feeler	1
6	A134 4721	Connector Cover	1
7	AF02 2077	Driven Roller	7
8	5206 2686	Snap Ring	2
9	A134 4739	Lower Guide Plate Knob	1
10	A158 4607	Upper Guide Plate	1
11	AF04 0031	Upper Exit Roller	7
12	A134 4619	Guide Plate Link	1
13	5447 2768	Stepped Screw - M3	1
14	A134 4730	Entrance Feeler	1
15	A134 4740	Lower Guide Plate	1
16	AA12 0067	Anti Static Brush	1
17	A154 4616	Paper Holder	6
18	A158 4603	Paper Holder	2
19	A134 4726	Guide Plate Knob	1
20	AA16 2068	Guide Plate Pad	1
21	A134 4884	Decal - Duplex Misfeed Removal	1
22	A158 4604	Duplex Lower Guide	1

Index No.	Part No.	Description	Q'ty Per Assembly
101	0802 5236	Tapping Screw - M4x8	
102	0443 0060W	Hexagon Head Tapping Screw - M3x6	
103	0344 0080F	Philips Truss Head Screw - M4x8	

23.DUPLEX TRAY 2 (A214)

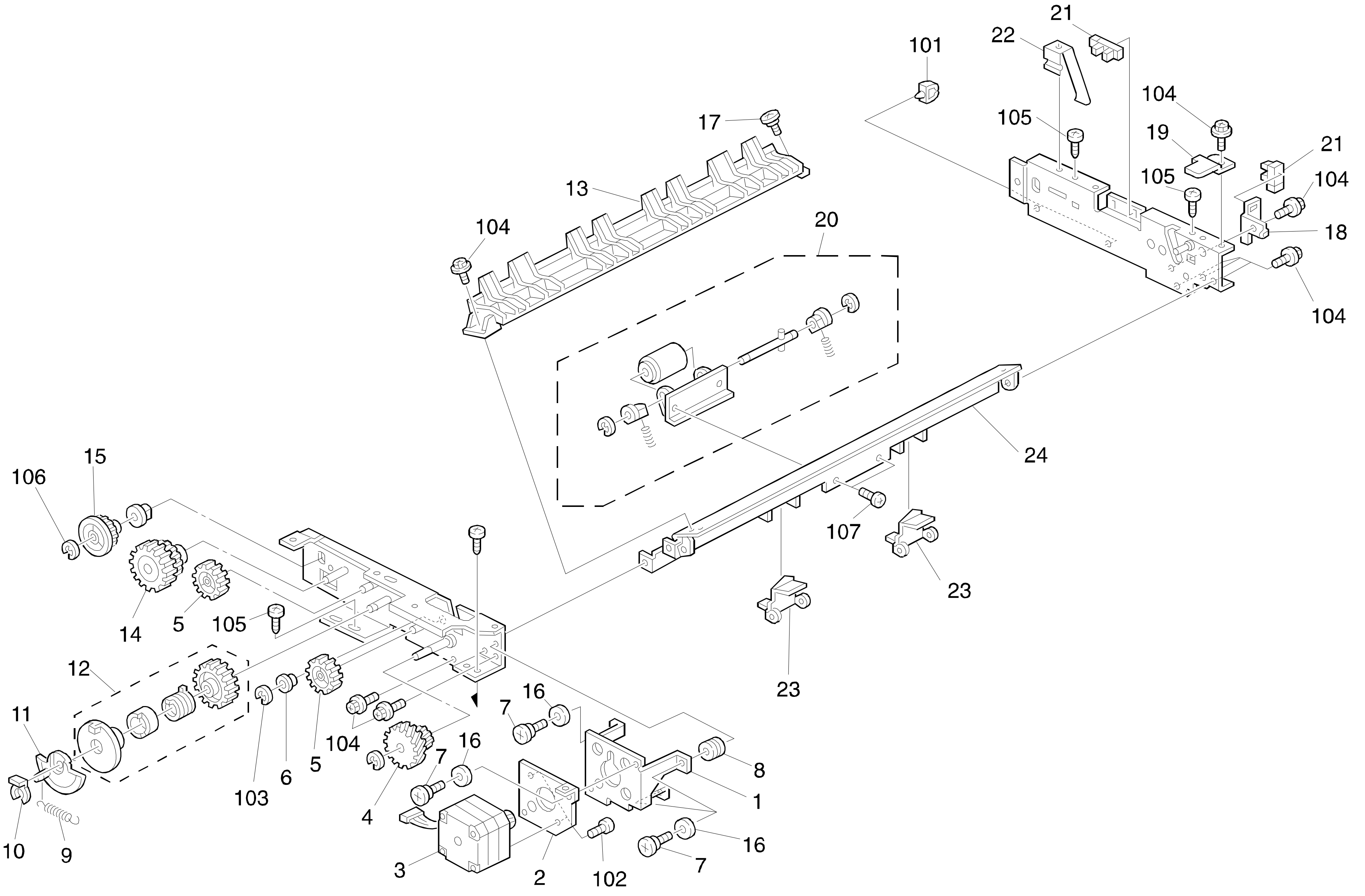

3
7
2
10
12
5
4
8
18
15
9
14
17
16
19
15
14
13
12
6
11
13
2
12
10
21
101
19
102
20
1
10
103

23.DUPLEX TRAY 2 (A214)

Index No.	Part No.	Description	Q'ty Per Assembly
1	A134 4751	Front Side Plate	1
2	AB03 0474	Pulley - 24Z	2
3	AA04 3390	Timing Belt - 40S2M192	1
4	5443 2668	Bushing - 4x6x7mm	2
5	AA11 1208	Paper End Sensor Feeler	1
6	AF02 0319	Transport Roller	1
7	AF02 0320	Right Transport Roller	1
8	A134 4676	Paper End Feeler	1
9	A134 4781	Rear Side Plate	1
10	5053 0447	Bushing - 6mm	4
11	AB01 1166	Gear - 33Z	1
12	5304 1639	Bushing - 8mm	2
13	5215 2621	Snap Ring - M6	3
14	A134 4809	Front Guide Holder	1
15	AF02 0317	Stack Roller	2
16	A134 4649	Paper Guide Holder	2
17	**AF03 1024**	**Feed Roller**	**1**
18	A134 4808	Rear Guide Holder	1
19	AF02 2077	Driven Roller	7
20	A134 4690	Clutch Stopper	1
21	A134 4512	Feed Roller Shaft	1

Index No.	Part No.	Description	Q'ty Per Assembly
101	0443 0060B	Hexagon Tapping Screw - M3x6	
102	0951 4008B	Philips Screw With Washer - M4x8	
103	0720 0040E	Retaining Ring - M4	

24.DUPLEX TRAY 3 (A214)

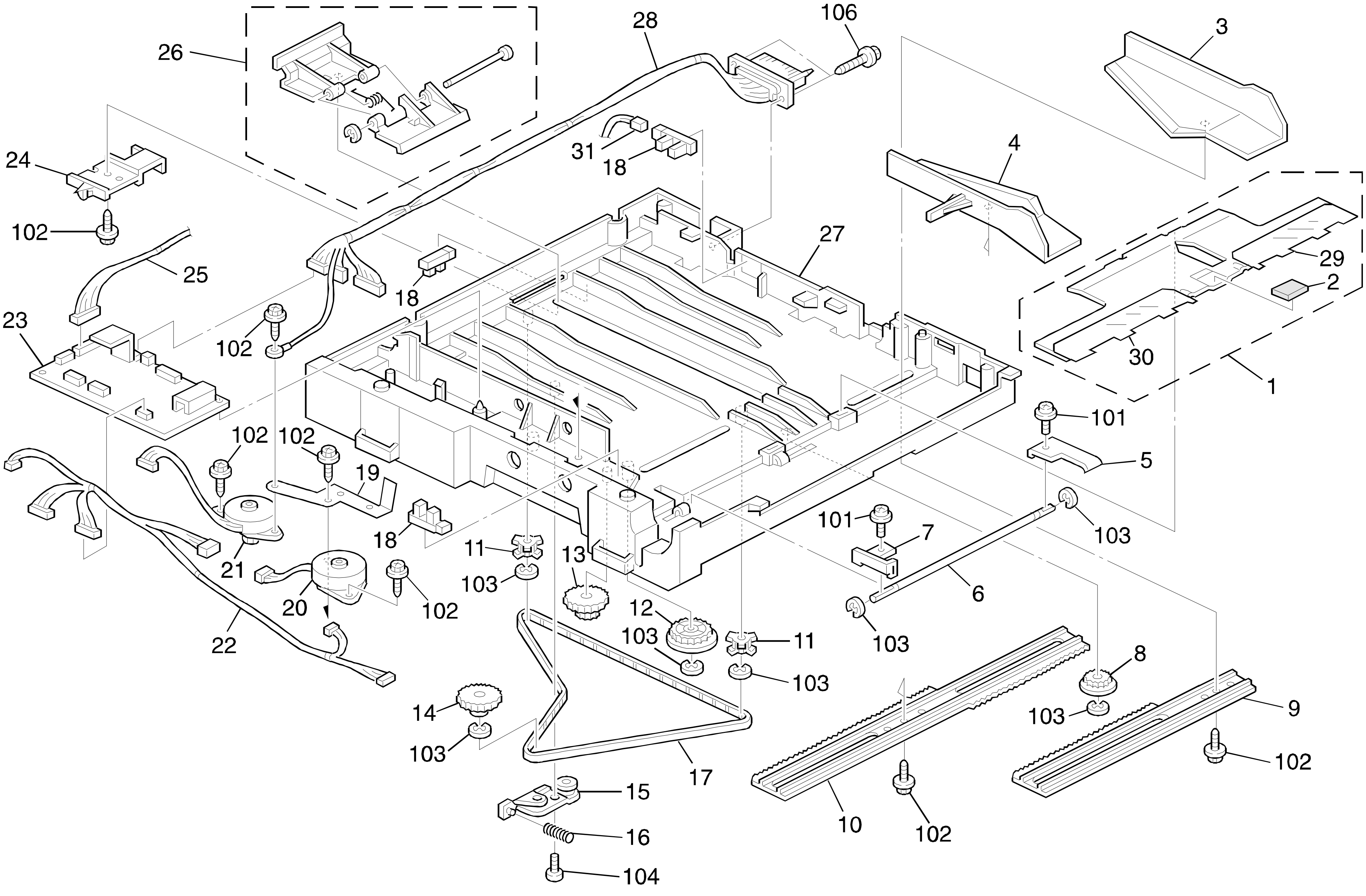

21
22
101
104
105
17
19
21
13
105
104
104
20
18
104
24
15
106
107
23
14
5
105
12
23
11
16
7
104
16
8
7
5
103
6
1
4
16
10
9
3
2
102
7

24.DUPLEX TRAY 3 (A214)

Index No.	Part No.	Description	Q'ty Per Assembly
1	A134 4799	Motor Bracket	1
2	A134 4800	Motor Bracket	1
3	A134 5290	Transport Drive Motor	1
4	AB01 7337	Gear - 15Z/55Z	1
5	AB01 1165	Gear - 32Z	2
6	5443 2668	Bushing - 4x6x7mm	2
7	A079 3626	Stepped Screw - Swing Cleaning	3
8	AA16 1067	Cushion - Motor	3
9	AA06 0593	Spring	1
10	5447 2681	Snap Ring	7
11	A334 4706	Disk - Bottom Plate Clutch	1
12	AB04 0015	Spring Clutch - Tray [illegible]om Plate	1
13	A134 4508	Inverter Guide Plate	1
14	AB01 7332	Gear - 24Z/41Z	1
15	AB01 1167	Gear - 25Z	1
16	AA13 2184	Motor Cushion	3
17	AA14 3307	Stepped Screw - M3x4	1
18	A134 4790	Paper End Sensor	1
19	A134 4804	Guide Plate Stopper	1
20	A134 4527	Separation Roller	1
21	AW02 0075	Photointerrupter	15
22	A134 4765	Grounding Plate	1
23	A134 4658	Vibrating Plate	2
24	A134 4662	Duplex Guide Plate	1

Index No.	Part No.	Description	Q'ty Per Assembly
101	1105 0199	Clamp	
102	0313 0050B	Philips Pan Head Screw - M3x5	
103	0720 0030E	Retaining Ring - M3	
104	0443 0060B	Hexagon Tapping Screw - M3x6	
105	0802 5236	Tapping Screw - M4x8	
106	0720 0040E	Retaining Ring - M4	
107	0434 0060B	Philips Tapping Screw - M4x6	

25.DUPLEX TRAY 4 (A214)



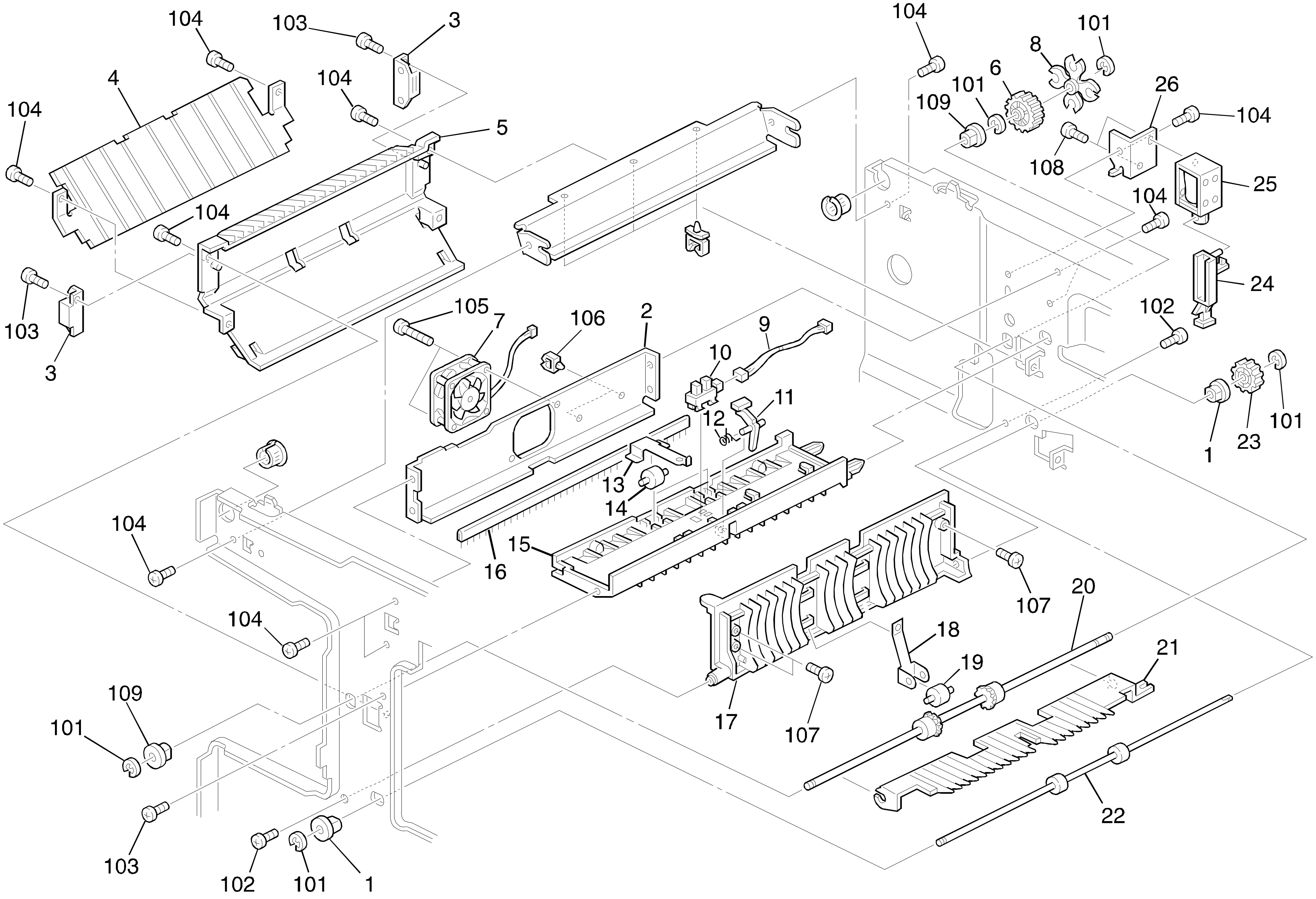
26
28
106
3
24
31
18
4
102
25
18
27
29
2
23
102
30
1
101
102
102
19
5
18
101
7
103
11
13
21
103
6
20
102
12
22
103
11
103
8
9
14
103
103
17
102
102
15
10
102
16
104

25.DUPLEX TRAY 4 (A214)

Index No.	Part No.	Description	Q'ty Per Assembly
1	A154 4620	Bottom Plate	1
2	**AF01 3003**	**Bottom Plate Pad - Duplex**	**1**
3	AF01 6160	Rear Side Fence	1
4	AF01 6161	Front Side Fence	1
5	A204 4651	Bottom Pressure Plate	1
6	AA14 0291	Bottom Plate Shaft	1
7	A491 4690	Bottom Plate Hook	1
8	G011 3305	Gear - 16T	2
9	A134 4689	Rear Side Fence Rack	1
10	A134 4688	Front Side Fence Rack	1
11	AB03 0473	End Fence Pulley - 22Z	2
12	AB01 3881	Gear - 31Z	1
13	AB01 7400	Gear- 18Z/68Z	1
14	AB01 7339	End Fence Gear - 22Z/58Z	1
15	A134 4714	Tightener	1
16	AA06 3370	Spring	1
17	AA04 3374	Timing Belt - S2M800	1
18	AW02 0075	Photointerrupter	15
19	A134 4620	Grounding Plate	1
20	A134 5291	Jogger Drive Motor - Side Fence	1
21	A134 5292	Jogger Drive Motor - End Fence	1
22	A134 5323	Motor Harness	1
23	A134 5254	Duplex Control Boar	1
24	A134 4710	End Fence Actuator	1
25	A134 5321	Sensor Relay Harness	1
26	A134 4525	End Fence	1
27	AF01 0018	Duplex Tray	1
28	A134 5320	Toner Bottle Cam	1
29	A154 4622	Rear Guide Plate	1
30	A154 4621	Front Guide Plate	1
31	A134 5322	End Fence Harness	1

Index No.	Part No.	Description	Q'ty Per Assembly
101	0951 3006B	Philips Screw With Flat Washer - M3x6	
102	0802 5232	Tapping Screw - M3x8	
103	0720 0040E	Retaining Ring - M4	
104	0802 5236	Tapping Screw - M4x8	
105	0802 5234	Tapping Screw - M3x12	

26.PAPER EXIT SECTION (A214)

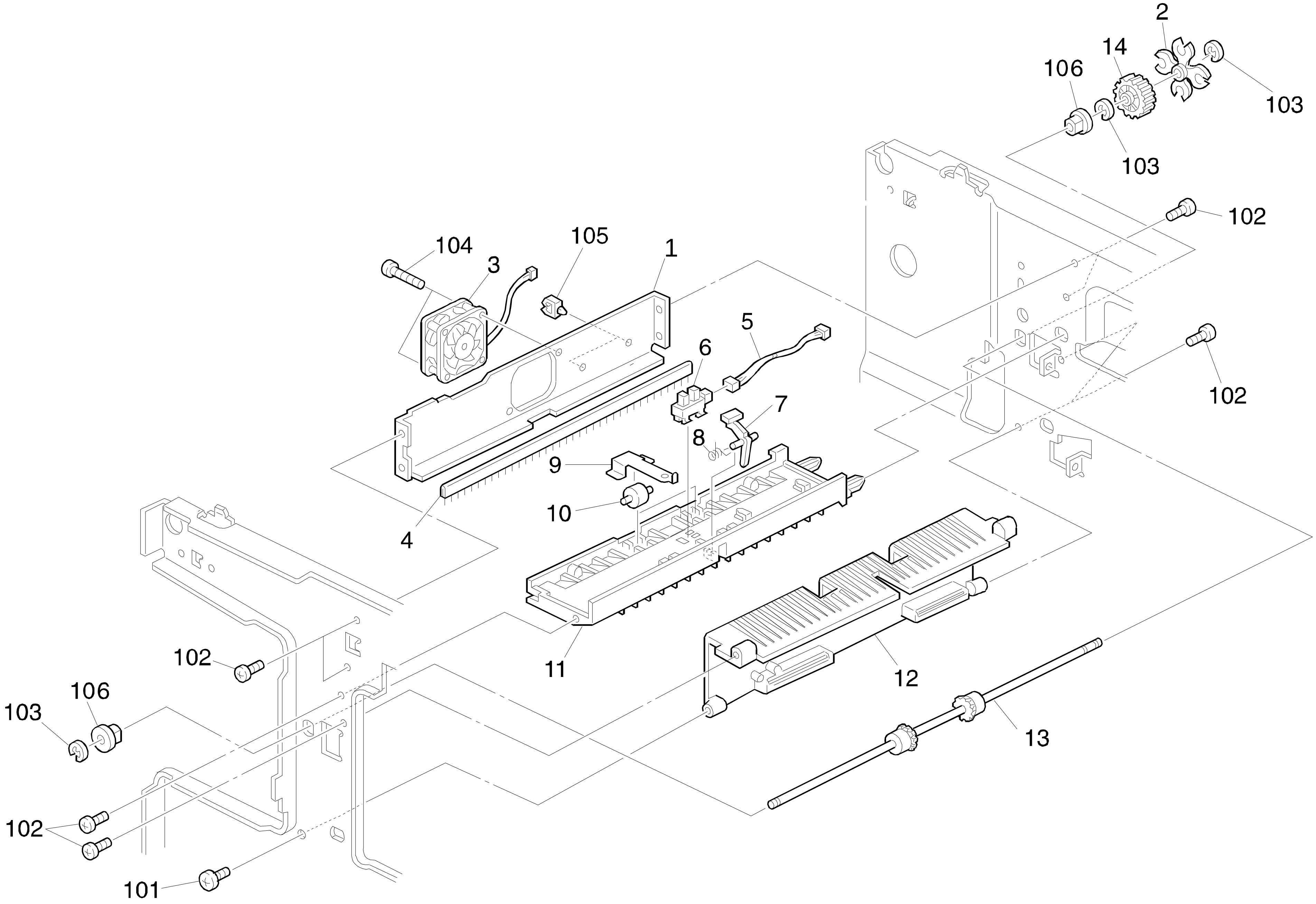

104
103
3
4
104
104
5
104
104
103
3
104
101
8
6
101
109
26
104
108
25
104
24
102
105
7
106
2
9
10
11
12
13
14
15
16
1
23
101
104
104
107
20
18
21
19
17
107
109
101
103
102
101
1
22

26.PAPER EXIT SECTION (A214)

Index No.	Part No.	Description	Q'ty Per Assembly
1	5053 0447	Bushing - 6mm	4
2	A157 1084	Morter Stay	1
3	AG07 0004	Magnetic Catch	6
4	A158 4452	Lower Reverse Guide Plate	1
5	A158 4451	Reverse Guide Plate	1
6	A212 4496	Gear - 24Z	1
7	AX64 0059	Fan Motor - DC24V 3.12W	2
8	A212 4495	Shift Clutch	1
9	A153 5328	CT Harness	1
10	AW02 0086	Photointerruptor	15
11	A157 4459	Paper Exit Feeler	1
12	AA06 6274	Spring	1
13	A157 4456	Spring Plate	2
14	AF02 2042	Middle Pressure Roller	2
15	A212 4450	Upper Guide Plate	1
16	AA12 0071	Exit Antistatic Brush	1
17	A158 4453	Exit Cover	1
18	A158 4459	Spring Plate	2
19	AF04 0031	Upper Exit Roller	7
20	AF02 0327	Exit Roller	1
21	AF02 5024	Pick-off Pawl	1
22	AF02 0336	Inverter Drive Roller	1
23	AB01 3106	Gear - Drive - Third - Z18	1
24	A158 4463	Pick-off Pawl Arm	1
25	AX12 0039	DC SOL 24V 400GF	1
26	A158 4467	Solenoid Bracket	1

Index No.	Part No.	Description	Q'ty Per Assembly
101	0720 0040E	Retaining Ring - M4	
102	0434 0080B	Philips Tapping Screw - M4x8	
103	0434 0082B	Tapping Screw - M4x8	
104	0434 0060B	Philips Tapping Screw - M4x6	
105	0353 0300B	Bind Screw - M3x30	
106	1105 0199	Clamp	
107	0802 5236	Tapping Screw - M4x8	
108	0313 0040B	Philips Pan Head Screw - M3x4	
109	0805 3480	Bushing - 6mm	

27.PAPER EXIT SECTION (A212)

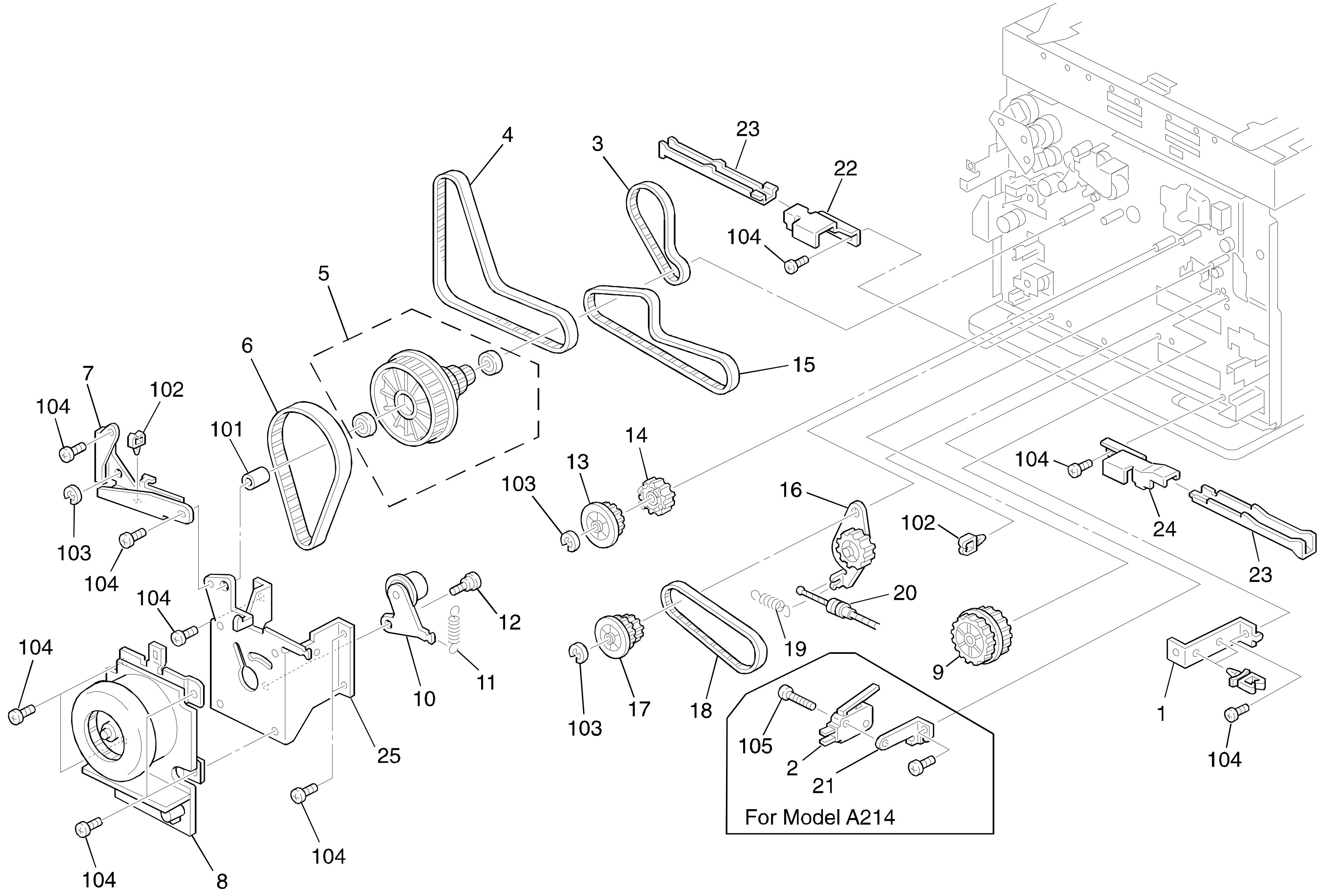

2
14
106
103
103
102
104
105
1
3
5
6
102
7
8
9
10
4
11
12
102
106
103
13
102
101

27.PAPER EXIT SECTION (A212)

Index No.	Part No.	Description	Q'ty Per Assembly
1	A157 1084	Moter Stay	1
2	A212 4495	Shift Clutch	1
3	AX64 0059	Fan Motor - DC24V 3.12W	2
4	AA12 0071	Exit Antistatic Brush	1
5	A153 5328	CT Harness	1
6	AW02 0075	Photointerrupter	15
7	A157 4459	Paper Exit Feeler	1
8	AA06 6274	Spring	1
9	A157 4456	Spring Plate	2
10	AF02 2042	Middle Pressure Roller	2
11	A212 4450	Upper Guide Plate	1
12	A212 4460	Exit Cover	1
13	AF02 0327	Exit Roller	1
14	A212 4496	Gear - 24Z	1
15	A470 1703	Shift Clutch	1

Index No.	Part No.	Description	Q'ty Per Assembly
101	0802 5236	Tapping Screw - M4x8	
102	0434 0060B	Philips Tapping Screw - M4x6	
103	0720 0040E	Retaining Ring - M4	
104	0353 0300B	Bind Screw - M3x30	
105	1105 0199	Clamp	
106	0805 3480	Bushing - 6mm	

28.DRIVE SECTION 1 (A212/A214)

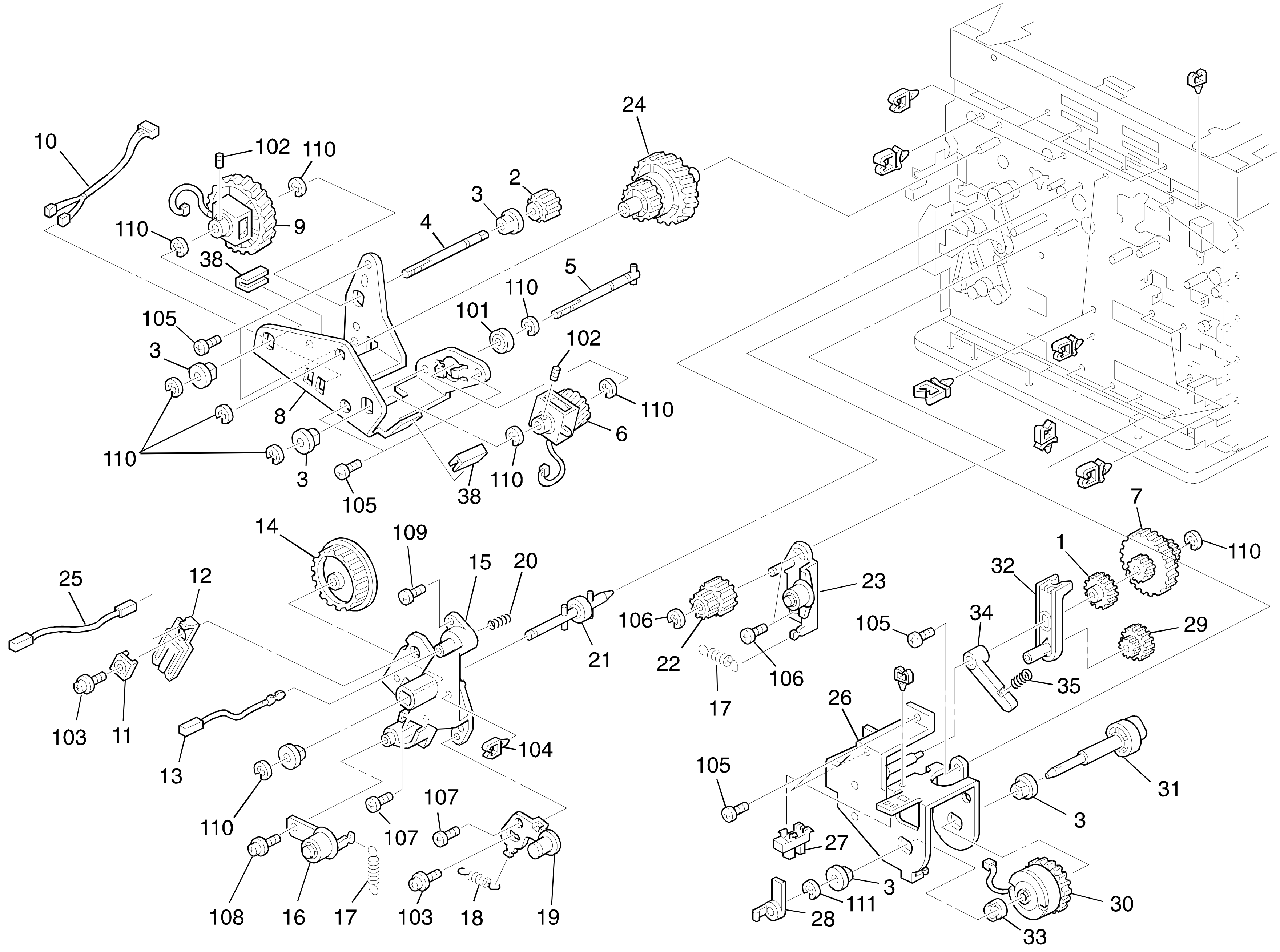

4
3
23
22
104
5
6
7
102
104
101
15
14
13
103
104
16
102
104
24
23
103
104
104
104
12
20
19
9
11
10
1
17
18
103
25
105
2
104
21
For Model A214
104
8
104

28.DRIVE SECTION 1 (A212/A214)

Index No.	Part No.	Description	Q'ty Per Assembly
1	A153 5802	Lower Bracket - DC Drive Board	1
2	1204 2356	Micro Switch - AM51612A531	1
3	AA04 3392	Drum Timing Belt	1
4	AA04 3420	Timing Belt - 80S3M519	1
5	AB03 0492	Pulley - 25/25/34/125Z	1
6	AA04 3391	Timing Belt - 160S2M328	1
7	A153 1131	Development Support Plate	1
8	AX06 0108	Motor - Dc24v 45w	1
9	AB01 7371	Exit Pulley	1
10	A153 1128	Tightener	1
11	AA06 0228	Spring - Transfer Drum Cleaning Sol	1
12	C105 2352	Stepped Screw - M6x1.7	1
13	AB03 0463	Fusing Cam Pulley	1
14	AB01 3872	Fusing Cam Gear - 28Z	1
15	AA04 3396	Timing Belt - 60S3M366	1
16	A134 1121	Joint Gear	1
17	AB01 7345	Timing Pulley - 35Z	1
18	AA04 3397	Timing Belt - 30S3M300	1
19	A212 1151	Tension Spring	2
20	AA05 1024	Release Wire	1
21	A158 4466	Switch Bracket	1
22	A134 1072	Right Bracket - Grip Plate	1
23	A134 1071	Left Grip Plate	2
24	A134 1073	Left Bracket - Grip Plate	1
25	A153 1107	Motor Bracket	1

Index No.	Part No.	Description	Q'ty Per Assembly
101	0707 8140B	Bushing - 8x14mm	
102	1105 0199	Clamp	
103	0720 0060E	Retaining Ring - M6	
104	0434 0060B	Philips Tapping Screw - M4x6	
105	0313 0140B	Philips Pan Head Screw - M3x14	

29.DRIVE SECTION 2 (A212/A214)

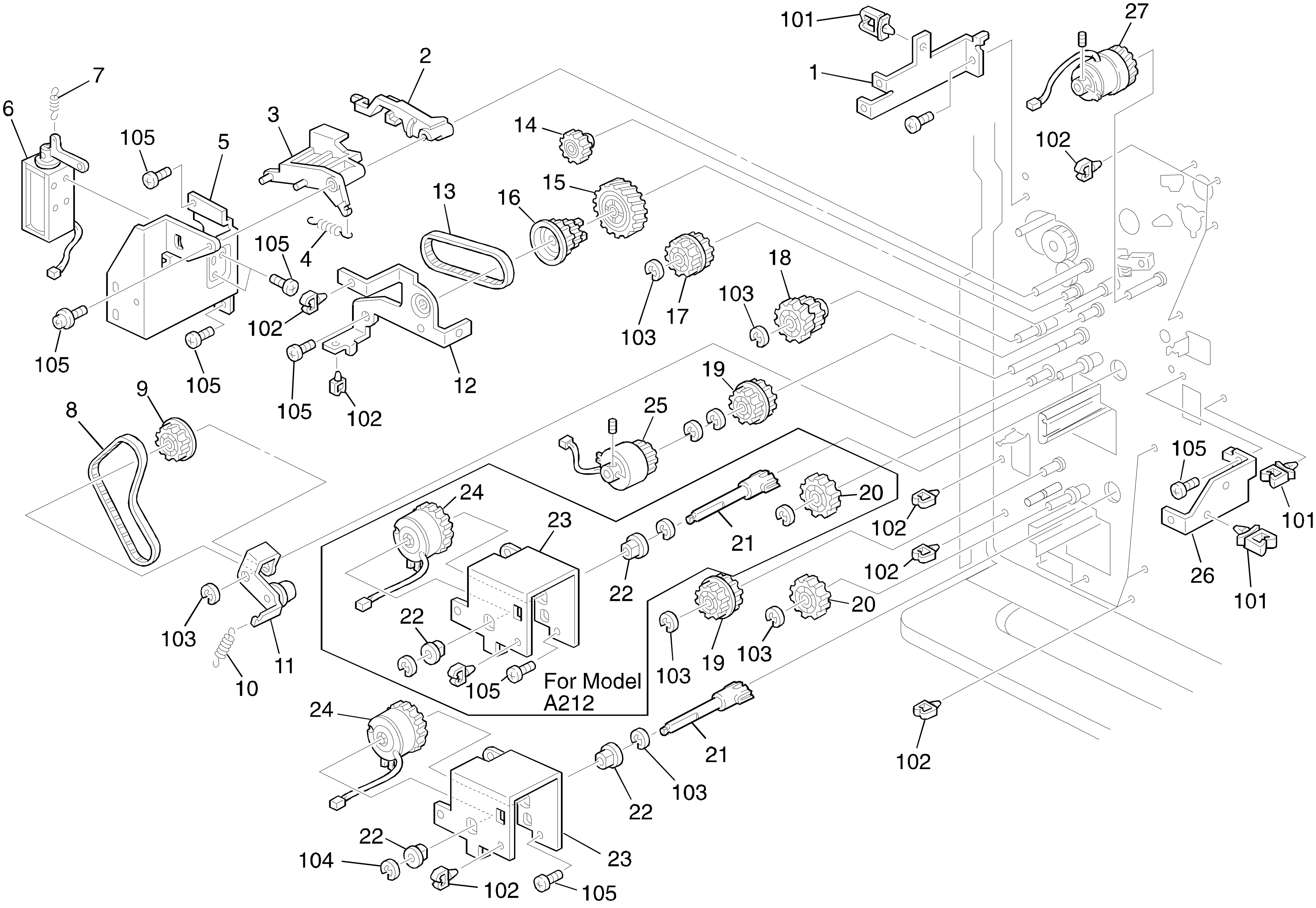

10
102
110
24
2
3
110
9
4
38
5
110
101
105
3
102
110
8
6
110
3
105
110
38
14
109
15
20
7
110
25
12
1
32
23
21
106
22
106
105
34
29
35
103
11
17
26
13
104
105
31
110
107
3
107
27
108
16
17
103
18
19
3
111
28
30
33

29.DRIVE SECTION 2 (A212/A214)

Index No.	Part No.	Description	Q'ty Per Assembly
1	AB01 7386	Cleaning Cam	1
2	AB01 3917	Toner Supply Gear	1
3	AA08 2047	Bushing - 8x16x7	9
4	AA14 5539	Solenoid Shaft	1
5	A153 1127	Clutch Shaft	1
6	AX20 0105	Magnetic Clutch - 15kgf 24Z	1
7	AB01 7368	Cleaning Drive Gear	1
8	A153 1125	Development Drive Bracket	1
9	AX20 0106	Magnetic Clutch - 15kgf 52Z	1
10	A153 5340	CT Harness	1
11	A212 3087	Terminal Cap	1
12	A153 3086	Bias Terminal	1
13	A153 2130	Receptacle Housing	1
14	AB03 0494	Drum Pulley	1
15	A153 1112	Drive Gear Holder	1
16	A153 1132	Development Tightener	1
17	A212 1151	Tension Spring	3
18	A212 1111	Spring Cover	2
19	A153 1135	Drum Drive Tightener	1
20	AA06 3552	Pressure Spring	1
21	A153 1117	Drum Drive Shaft	1
22	AB01 7369	Transfer Belt Pulley	1
23	A157 1111	Belt Tightener	1
24	AB01 7370	Development Pulley	1
25	AZ43 0020	High Voltage Supply Coard	1
26	A204 3915	Magnet Clutch Bracket	1
27	AW02 0086	Photointerrupter	15
28	A212 3914	Magnetic Clutch Feeler	1
29	AB01 7385	Gear - 17Z/24Z	1
30	AX21 0059	Spring Clutch	1
31	A204 3911	Cam Shaft	1
32	A212 2142	Cam Lever	1
33	A204 3922	Brake Cam	1
34	A204 3921	Clutch Arm	1
35	A212 3851	Spring - T/S Unit	1

Index No.	Part No.	Description	Q'ty Per Assembly
101	0740 3008	Ball Bearing - 8x22x7	
102	0573 0040E	Hexagon Headless Set Screw - M3x4	
103	0951 4012B	Philips Screw With Flat Washer	
104	1105 0199	Clamp	
105	0434 0060B	Philips Tapping Screw - M4x6	
106	0414 0080B	Tapping Screw - M4x8	
107	0802 5236	Tapping Screw - M4x8	
108	0802 5221	Tapping Screw - M3x10	
109	0952 4008B	Sem's Screw - M4x8	
110	0720 0060E	Retaining Ring - M6	
111	0720 0060	Retaining Ring - M6	

30.DRIVE SECTION 3 (A212/A214)

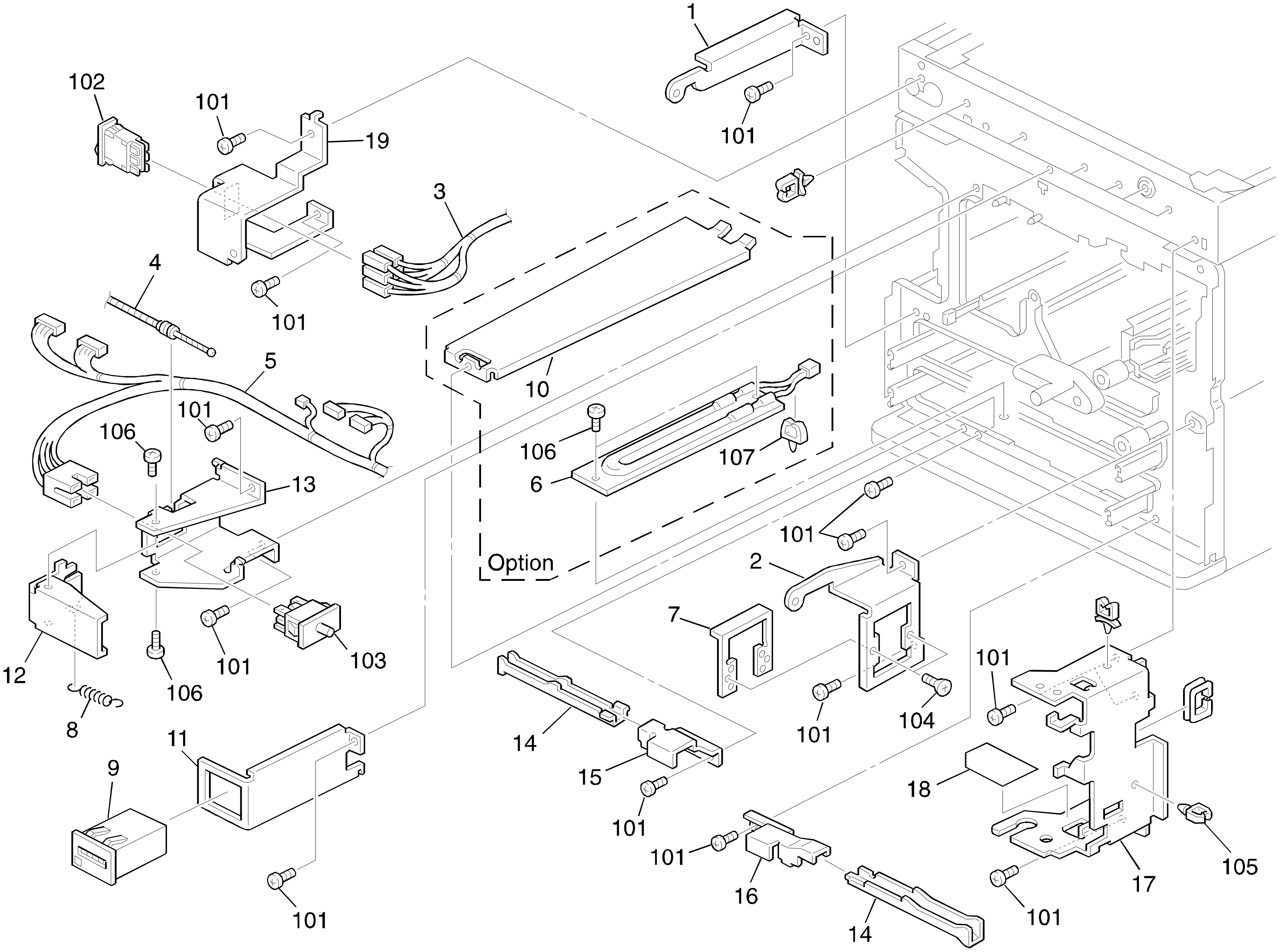

101
27
1
2
7
6
105
5
3
14
102
15
16
13
4
105
102
105
17
103
18
103
105
105
105
102
12
9
8
19
25
24
23
20
21
22
102
105
101
102
26
101
103
11
10
22
105
For Model
A212
103
19
103
20
24
21
103
22
102
22
104
102
105
23

30.DRIVE SECTION 3 (A212/A214)

Index No.	Part No.	Description	Q'ty Per Assembly
1	A153 5813	Main Control Board Bracket	1
2	A134 2679	Pick-up Lever	1
3	A134 2678	Solenoid Link (A212)	1
3	A155 2677	Pick-up Link (A214)	1
4	A212 2673	Release Spring	1
5	A134 2676	Solenoid Bracket (A212)	1
5	A155 2675	Pick-up Bracket (A214)	1
6	A134 2680	DC Solenoid	1
7	A212 2672	Pressure Spring	1
8	A212 2531	Timing Belt - S3M 300	1
9	AB03 0491	Timing Pulley - 25Z	1
10	A212 3072	Relay Adjusting Spring	2
11	A212 2564	Tightener	1
12	A157 2560	Paper Feed Support Plate	1
13	AA04 3389	Timing Belt - 60S3M201	1
14	AB01 1153	Idle Gear - 25Z	1
15	AB01 3918	Drive Gear - 35Z	1
16	AB03 3064	Drive Pulley	1
17	AB01 7395	Timing Pulley	1
18	AB01 7377	Gear - 25Z	1
19	AB01 7394	Timing Pulley - 24T/20Z	2
20	AB01 3908	Gear - 27Z	1
21	A212 2584	Paper Feed Drive Shaft	1
22	AA08 2047	Bushing - 8x16x7	9
23	A212 2562	Solenoid Bracket	1
24	AX21 0058	Magnetic Clutch - 42 [illegible]	1
25	AX20 0107	Magnetic Clutch - 10kgf 25Z	1
26	A153 5812	Left Lower Bracket	1
27	AX20 0109	Magnetic Clutch - 10kgf.cm 35Z	1

Index No.	Part No.	Description	Q'ty Per Assembly
101	1105 0192	Locking Support	
102	1105 0199	Clamp	
103	0720 0060E	Retaining Ring - M6	
104	0720 0040E	Retaining Ring - M4	
105	0434 0060B	Pan Head Self-tapping Screw - M4x6	

31.ELECTRICAL SECTION 1 (A212/A214)



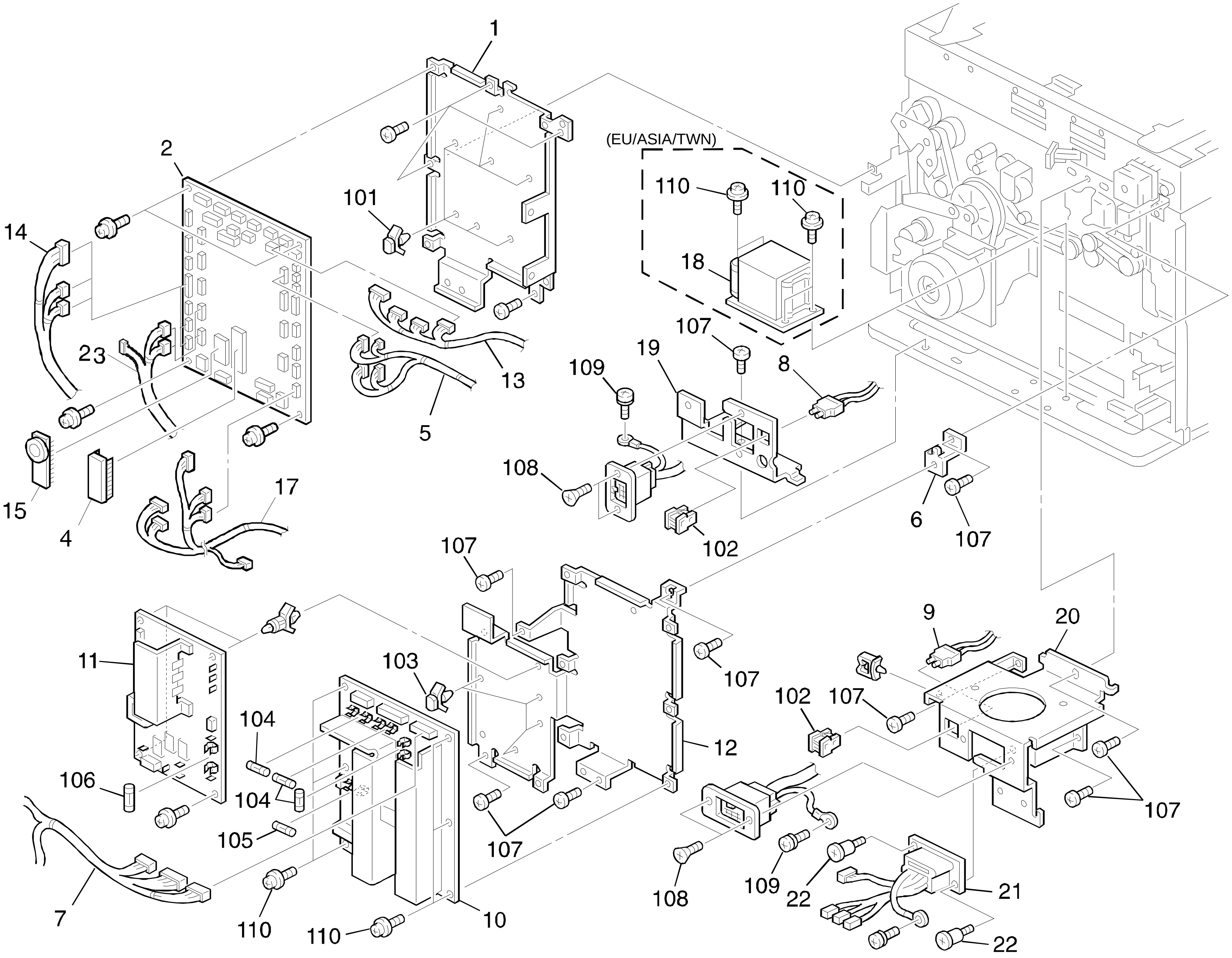
1
101
102
101
19
3
101
4
5
10
101
106
13
106
107
6
Option
101
2
7
12
101
106
103
101
104
101
8
11
14
15
101
9
18
101
101
16
14
17
105
101
101

31.ELECTRICAL SECTION 1 (A212/A214)

Index No.	Part No.	Description	Q'ty Per Assembly
1	A153 1353	Front Cover Hinge	1
2	A153 1355	Key Counter Bracket	1
3	A212 5661	AC Main Harness	1
4	AA05 1024	Release Wire	1
5	A212 5520	Front Right Harness (NA)	1
5	A212 5320	Front Right Harness (EU/ASIA/TWN)	1
6	AX40 0021	Tray Anticondensation Heater - 115V 18W (Option)	1
6	AX40 0022	Tray Anticondensation Heater - 240V 18W (Option)	1
7	5446 1239	Plate Nut - Key Counter	1
8	A212 4467	Spring - Stripper Pawl Release	2
9	AX31 0024	Total Counter	1
10	A134 2947	Heater Cover (Option)	1
11	A212 5820	Total Counter Bracket	1
12	A153 5809	Arm Interlock SW	1
13	A153 5808	Bracket - Safety Switch	1
14	A134 1071	Left Grip Plate	2
15	A134 1072	Right Bracket - Grip Plate	1
16	A134 1073	Left Bracket - Grip Plate	1
17	A212 3270	Stay - Toner Supply	1
18	A212 3071	Deveropper Rail Seal	1
19	A212 5814	Main Switch Bracket (NA)	1
19	A212 5804	Main Switch Bracket (EU/ASIA/TWN)	1

Index No.	Part No.	Description	Q'ty Per Assembly
101	0434 0060B	Philips Tapping Screw - M4x6	
102	1204 2444	Main Switch (NA)	
102	1204 1545	Main Switch (EU/ASIA/TWN)	
103	1204 2397	Safety Switch	
104	0323 0080B	Philips Sunk Screw - M3x8	
105	1105 0229	Clamp	
106	0314 0060B	Philips Pan Head Screw - M4x6	
107	1105 0231	Clamp	

32.ELECTRICAL SECTION 2 (A212/A214)

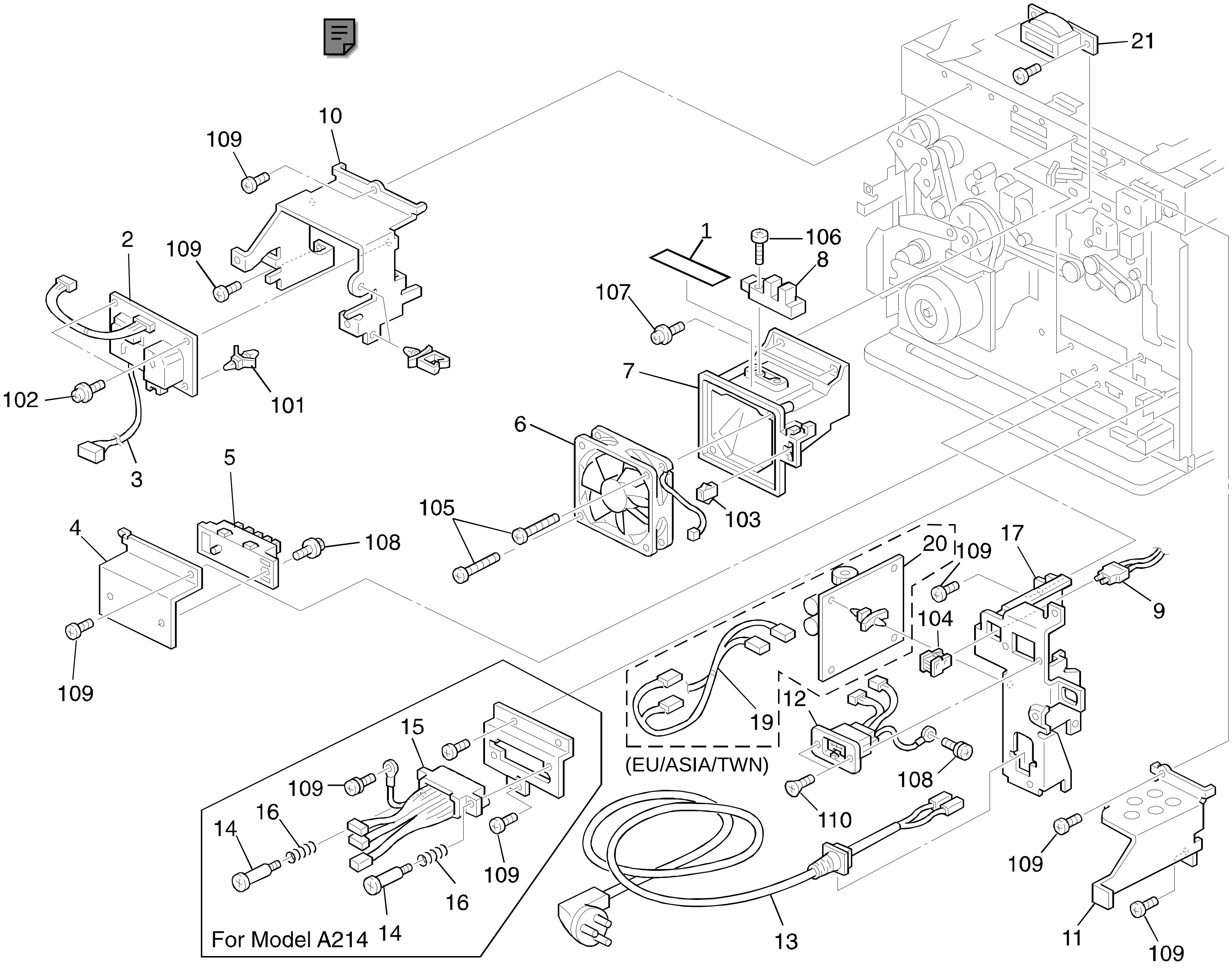

1
2
(EU/ASIA/TWN)
110
110
101
14
18
107
19
109
8
23
13
5
108
15
4
17
6
107
102
107
9
20
11
103
107
102
107
104
12
106
104
105
107
107
108
109
22
21
7
110
110
10
22

32.ELECTRICAL SECTION 2 (A212/A214)

Index No.	Part No.	Description	Q'ty Per Assembly
1	A212 5811	Main Control Board Bracket	1
2	A212 5101	Main Control Board (NA)	1
2	A212 5201	Main Control Board (EU/ASIA/TWN)	1
4	A212 5103	IC - 4MX16 - 120NS	1
5	A212 5319	Rear Upper Harness	1
6	A153 5803	Upper Bracket - DC Drive Board	1
7	A153 5344	Power Supply Harne 2trays (A212)(NA)	1
7	A153 5644	Power Supply Harne 2trays (A212) (EU/ASIA/TWN)	1
7	A158 5343	Duplex Power Supply Harness (A214)(NA)	1
7	A160 5643	Duplex Power Supply Harness (A214) (EU/ASIA/TWN)	1
8	AW03 0055	Optical Fiber - 420mm	1
9	AW03 0054	Optical Fiber - 250mm	1
10	AZ23 0055	DC Drive Board - 100/120V (NA)	1
10	AZ23 0060	DC Drive Board - 220V/240V (EU/ASIA/TWN)	1
11	A153 5545	AC Drive Board - 120V (NA)	1
11	A153 5645	AC Drive Board (230V)(EU/AISA/TWN)	1
12	A153 5801	DC Drive Board Bracket	1
13	A212 5312	Optical Harness	1
14	A212 5316	Paper Feed Harness -2trays (A212)	1
14	A158 5310	Duplex Paper Feed Harness (A214)	1
15	A153 5114	RAM Board	1
17	A157 5311	Rear Lower Harness - 2tray (A212)	1
17	A214 5309	Rear Lower Harness - Duplex (A214)	1
18	AZ13 0023	Transformer - 230V	1
19	A153 5806	Bracket Paper Tray Unit	1
20	A212 5807	Bracket Ardf	1
21	A204 5326	Fusing Relay Harness	1
22	AA14 3301	Stepped Screw - M3x4	2
23	A155 5314	LCT Relay Harness	1

Index No.	Part No.	Description	Q'ty Per Assembly
101	1105 0367	Spacer	
102	1102 4052	Optional Connector	
103	1105 0409	Spacer	
104	1107 0392	Fuse (Glass Case) - 6.3A - 125V (NA)	
104	1107 0752	Fuse (Glass Case) - 5A - 250V (EU/AISA/TWN)	
105	1107 0393	Fuse (Glass Case) - 8A - 125V (NA)	
105	1107 0753	Fuse (Glass Case) - 6.3A - 250V (EU/AISA/TWN)	
106	1107 0753	Fuse (Glass Case) - A - 250V (EU/AISA/TWN)	
106	1107 0554	Fuse (Glass Case) - 17A - 125V (NA)	
107	0434 0060B	Philips Tapping Screw - M4x6	
108	0323 0060B	Philips Sunk Screw - M3x6	
109	0801 0137	Philips Pan Head Screw With Spring	
110	0951 3006B	Philips Screw With Flat Washer - M3x6	

33.ELECTRICAL SECTION 3 (A212/A214)

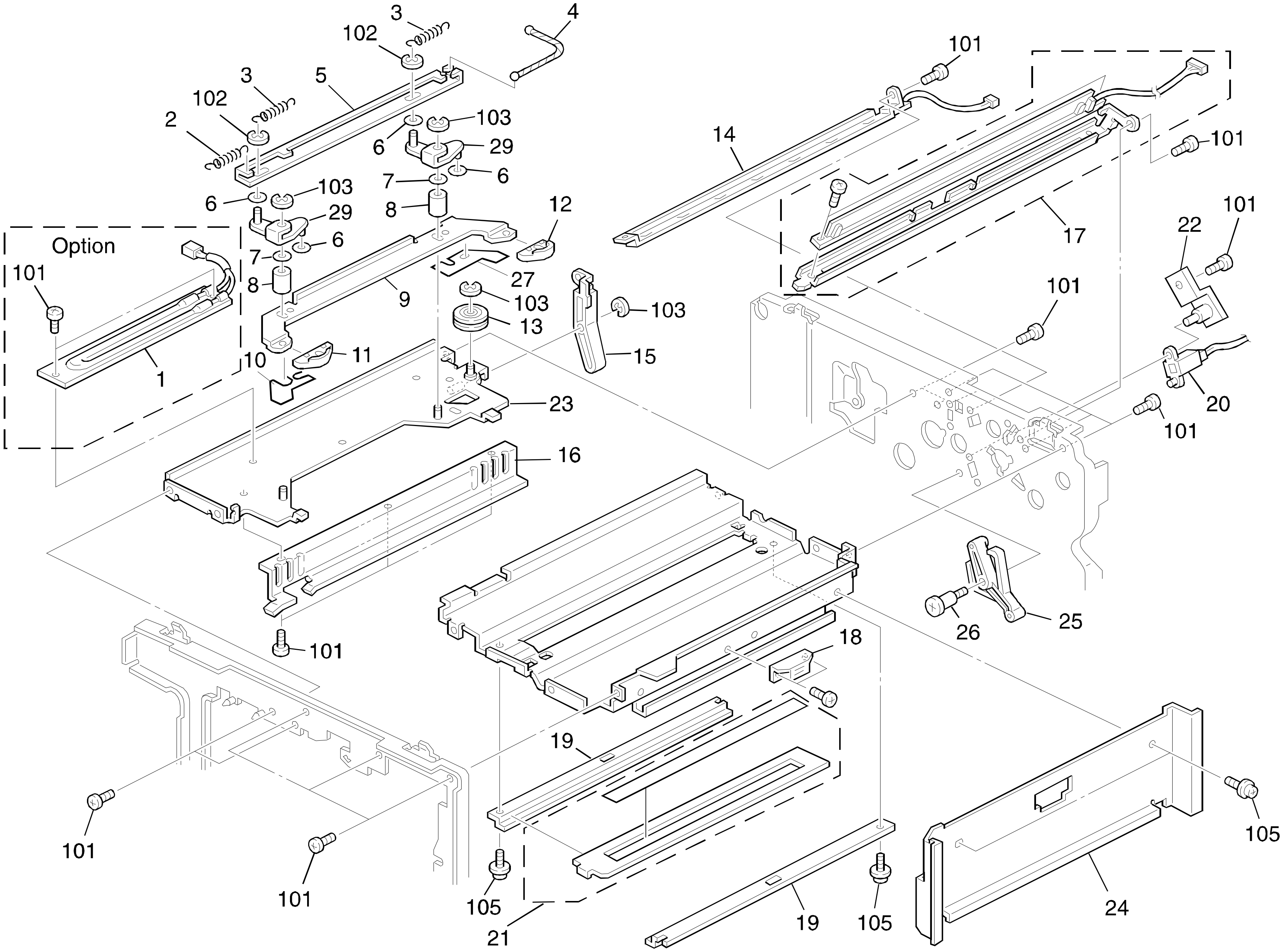

21
10
109
1
106
8
2
109
107
7
102
101
6
3
5
105
103
4
108
20
109
17
9
104
109
12
19
15
(EU/ASIA/TWN)
108
109
16
110
14
109
109
16
14
13
11
109
For Model A214

33.ELECTRICAL SECTION 3 (A212/A214)

Index No.	Part No.	Description	Q'ty Per Assembly
1	AA15 1177	Seal - 5x82x4	1
2	AZ32 0078	DC Power Pack	1
3	AZ43 0020	High Voltage Supply Coard	1
4	A134 2941	Tray Sensor Bracket	1
5	AW50 0010	Push Switch	2
6	AX64 0058	Fan Motor - DC 24V 4.32W	2
7	A153 1986	Cooling Fan Duct	2
8	AW02 0022	Photointerruptor	2
9	AW03 0056	Optical Fiber - 550mm	1
10	A212 1258	Right Bracket - Platen Ccover	1
11	A153 1259	Platen Cover Bracket - Left	1
12	A212 5324	Sorter Relay Harness	1
13	A153 5571	Power Supply Cord - 120V (NA)	1
13	A153 5671	Power Supply Cord (EU/ASIA/TWN)	1
14	AA14 3452	Stepped Screw	2
15	A154 5325	Duplex Unit Relay Harness	1
16	AA06 3532	Spring	2
17	A212 5810	Power Supply Cord Bracket	1
19	A153 5601	AC Relay Harness	1
20	A153 5621	Noise Filter Board	1
21	AZ02 0008	Coil - 1 0mh 2A	1

Index No.	Part No.	Description	Q'ty Per Assembly
101	1105 0192	Locking Support	
102	0951 3006B	Philips Screw With Flat Washer - M3x6	
103	1102 4473	CT Connector - 2p	
104	1102 4052	Optional Connector	
105	0434 0352W	Pan Head Self-tapping Screw - M4x35	
106	0414 0142B	Binding Self Tapping Screw - M4x14	
107	0964 4008B	Tapping Screw With Flat Washer - M4x8	
108	0443 0060B	Hexagon Tapping Screw - M3x6	
109	0443 0080B	Tapping Screw - M3x8	
110	0323 0060B	Philips Sunk Screw - M3x6	

34.FRAME SECTION 1 (A212/A214)

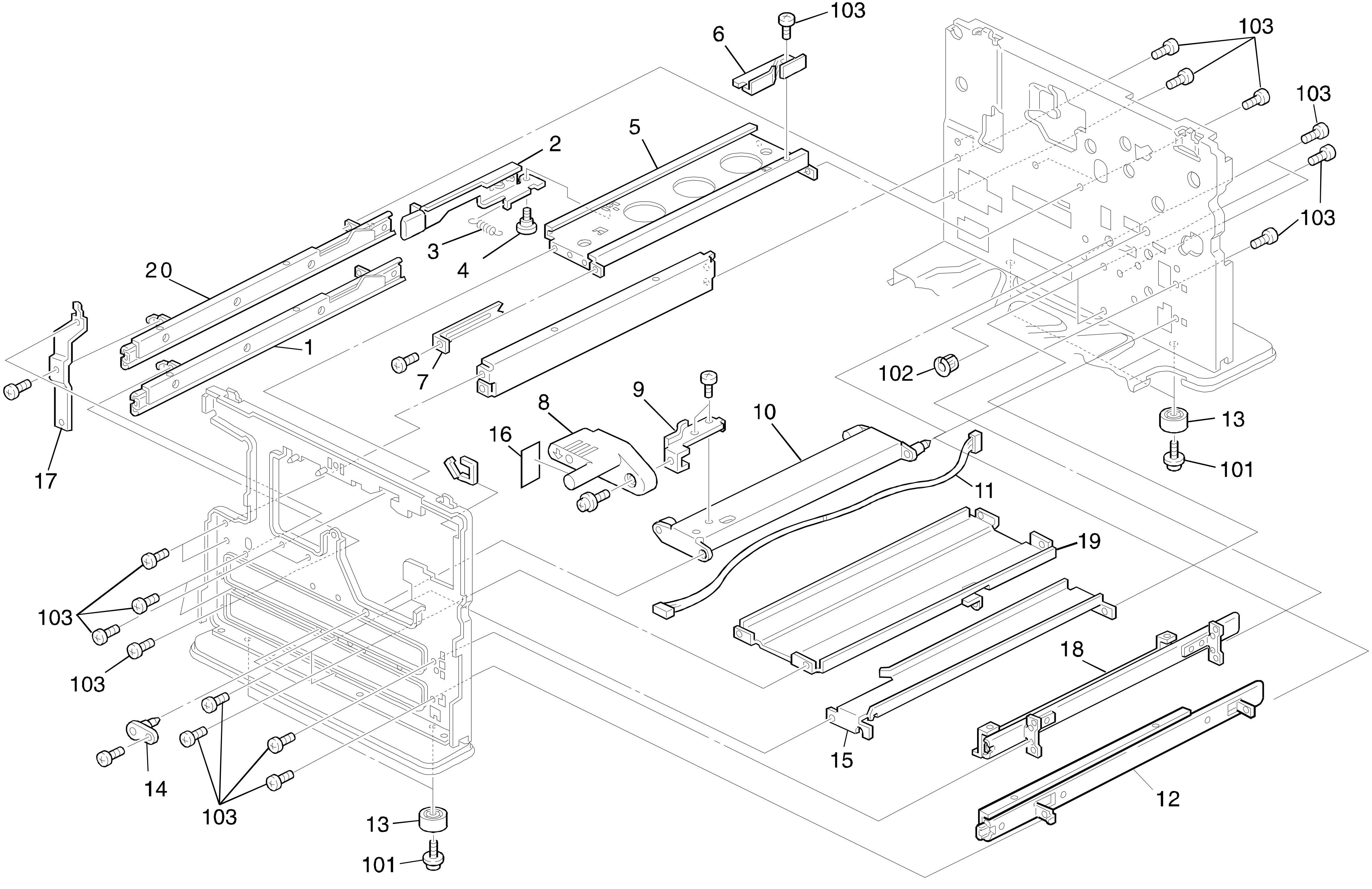

Option
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
29
101
102
103
105

34.FRAME SECTION 1 (A212/A214)

Index No.	Part No.	Description	Q'ty Per Assembly
1	AX40 0094	Anticondensation Heater - 120V 9W (Option)	1
1	AX40 0095	Anticondensation Heater - 230V 9W (Option)	1
2	A212 2102	Pressure Spring	1
3	A212 2101	Release Spring	2
4	AA05 1025	Release Wire	1
5	A153 2072	Release Link Lever	1
6	A204 2187	Spacer-11mm	4
7	A204 2188	Spacer-15mm	2
8	AA13 2186	Collar	2
9	A153 2073	Guide Rail	1
10	A153 2084	Spacer	2
11	A153 2075	Front Roller Cam	1
12	A153 2076	Rear Roller Cam	1
13	A212 2060	Wire Pulley	1
14	A153 2090	Quenching Lamp	1
15	A212 2071	Cam Lever	1
16	A153 2083	Left Drum Rail	1
17	A153 2080	Eraser Lamp	1
18	AG07 0004	Magnetic Catch	6
19	A212 1674	Shield Glass Guide	2
20	A153 5339	Density Sensor Harness	1
21	A204 1677	Optical Filter	1
22	A153 3598	Pin Bracket	1
23	A153 2052	Release Bracket	1
24	A212 1350	Right Middle Cover	1
25	A153 3920	Belt Release Arm	1
26	AA14 3444	Stepped Screw	1
27	A153 2085	Spacer	1
28	A153 1675	Harness Guard Seal	1
29	A153 2061	Release Lever	1

Index No.	Part No.	Description	Q'ty Per Assembly
101	0434 0060B	Philips Tapping Screw - M4x6	
102	0720 0030E	Retaining Ring - M3	
103	0720 0040E	Retaining Ring - M4	
104	0964 4006B	Tapping Screw With Flat Washer - M4x6	
105	0313 0040B	Philips Pan Head Screw - M3x4	

35.FRAME SECTION 2 (A212/A214)


103
6
103
103
103
5
2
3
4
20
1
17
7
8
9
10
16
102
13
101
11
19
103
103
18
15
14
103
12
13
101

35.FRAME SECTION 2 (A212/A214)

Index No.	Part No.	Description	Q'ty Per Assembly
1	A212 2822	Left Slide Rail Ass'y	1
2	A212 4352	Fusing Lock Lever	1
3	A212 4467	Spring - Stripper Pawl Release	1
4	5203 1686	Screw - SLID RAIL	1
5	A134 4351	Stay - Fusing Rail	1
6	A208 4355	Grounding Brush - Fusing Entrance	1
7	A134 4355	Fusing Unit Stopper	1
8	A212 3930	Belt Unit Handle	1
9	A153 3933	Stopper Stay	1
10	A153 3931	Transport Unit Stay	1
11	A212 5334	CT Harness - 7p	1
12	A212 2823	Right Slide Rail Ass'y	1
13	AH01 0007	Rubber Foot	1
14	A157 3900	Support Plate	1
15	A212 2652	Middle Guide Rail	1
16	A153 3929	Decal - Caution Lever	1
17	A212 2929	Right Rail - Feed Tray	1
18	A134 4901	Right Slide Rail Ass	1
19	A212 1088	Middle Lower Stay	1
20	A134 2927	Tray Lock Bracket	1

Index No.	Part No.	Description	Q'ty Per Assembly
101	0960 4010B	Philips Flange Screw - M4x10	
102	1106 0193	Bushing - 7.9mm	
103	0434 0060B	Pan Head Self-tapping Screw - M4x6	

36.MAIN CONTROL BOARD (A212/A214)

CAPACITOR

SYMBOL NO.	INDEX NO.
C 1	190
C 2	190
C 3	191
C 4	182
C 5	190
C 6	182
C 7	191
C 8	191
C 9	191
C 10	190

SYMBOL NO.	INDEX NO.
C 11	190
C 12	182
C 13	192
C 14	182
C 15	189
C 16	190
C 17	190
C 18	182
C 19	190
C 20	192

SYMBOL NO.	INDEX NO.
C 21	191
C 22	182
C 23	190
C 24	190
C 25	182
C 26	191
C 27	191
C 28	191
C 29	190
C 30	182

SYMBOL NO.	INDEX NO.
C 31	190
C 32	191
C 33	190
C 34	190
C 35	190
C 36	190
C 37	191
C 38	191
C 39	190
C 40	191

SYMBOL NO.	INDEX NO.
C 41	191
C 42	182
C 43	190
C 44	190
C 45	190
C 46	190
C 47	190
C 48	190
C 49	190
C 50	190

SYMBOL NO.	INDEX NO.
C 51	190
C 52	190
C 53	190
C 54	190
C 55	191
C 56	188
C 57	188
C 58	190
C 59	182
C 60	189

SYMBOL NO.	INDEX NO.
C 61	191
C 62	190
C 63	191
C 64	190
C 65	190
C 66	191
C 67	182
C 68	182
C 69	190
C 70	190

CAPACITOR

SYMBOL NO.	INDEX NO.
C 71	190
C 72	182
----	----
C 107	185
C 108	----
C 109	185
----	----
C 149	185
----	----
C 159	153
----	----

SYMBOL NO.	INDEX NO.
C 208	185
----	----
C 217	187
C 218	187
C 219	----
C 220	187
C 221	185
C 222	186
----	----
----	----
----	----

SYMBOL NO.	INDEX NO.
C 300	190
C 301	190
C 302	190
C 303	190
C 304	190
C 305	190

CNNECTOR

SYMBOL NO.	INDEX NO.
CN 101	126
CN 102	115
CN 103	197
CN 104	9
CN 105	123
CN 106	114
CN 107	3
CN 108	102
CN 109	130
CN 110	128

SYMBOL NO.	INDEX NO.
CN 111	131
CN 112	4
CN 113	121
CN 114	115
CN 115	5
CN 116	3
CN 117	113
CN 118	7
CN 119	117
CN 120	6

SYMBOL NO.	INDEX NO.
CN 121	132
CN 122	110
CN 123	122
CN 124	118
CN 125	----
CN 126	125
CN 127	119
CN 128	6
CN 129	120
CN 130	128

SYMBOL NO.	INDEX NO.
CN 131	112
CN 132	127
CN 133	----
CN 134	102
CN 135	128
CN 136	129
CN 137	5
CN 138	----
CN 139	120
CN 140	8

36.MAIN CONTROL BOARD (A212/A214)

CNNECTOR

SYMBOL NO.	INDEX NO.
CN 141	102
CN 142	111
CN 143	124
CN 144	----
CN 145	195

DIODE

SYMBOL NO.	INDEX NO.
D 1	138
----	----
D 20	198
D 21	198
D 22	198
D 23	138
D 24	138
D 25	138
D 26	138
D 27	138

SYMBOL NO.	INDEX NO.
D 28	138
D 29	137
D 30	137
D 31	137

FILTER

SYMBOL NO.	INDEX NO.
FIL 1	152

IC

SYMBOL NO.	INDEX NO.
IC 1	143
(IC 1)	1
IC 2	149
IC 3	140
IC 4	147
IC 5	----
IC 6	140
IC 7	140
IC 8	146
IC 9	201
IC10	140

SYMBOL NO.	INDEX NO.
IC 11	202
IC 12	3
IC 13	203
(Socket)	196
IC 14	142
IC 15	140
IC 16	144
IC 17	----
IC 18	147
IC 19	----
IC 20	----

SYMBOL NO.	INDEX NO.
IC 100	141
IC 101	148
IC 102	141
IC 103	145
IC 104	145
IC 105	145
IC 106	141
IC 107	141
----	----
IC 145	2

JP

SYMBOL NO.	INDEX NO.
JP 1	184
JP 2-1	205
JP 2-2	205

OSC

SYMBOL NO.	INDEX NO.
OSC 1	183

Q

SYMBOL NO.	INDEX NO.
Q 1	135
Q 2	135
Q 3	135
-----	----
Q 102	134
Q 103	----
Q 104	134

REG

SYMBOL NO.	INDEX NO.
REG 101	204

RESISTOR

SYMBOL NO.	INDEX NO.
R 1	160
R 2	193
R 3	165
R 4	157
R 5	166
R 6	156
R 7	178
R 8	166
R 9	166
R 10	166

SYMBOL NO.	INDEX NO.
R 11	166
R 12	166
R 13	160
R 14	193
R 15	167
R 16	161
R 17	176
R 18	177
R 19	156
R 20	178

SYMBOL NO.	INDEX NO.
R 21	163
R 22	163
R 23	----
R 24	----
R 25	----
R 26	----
R 27	157
R 28	157
R 29	157
R 30	157

36.MAIN CONTROL BOARD (A212/A214)

RESISTOR

SYMBOL NO.	INDEX NO.
R 31	157
R 32	157
R 33	157
R 34	157
R 35	157
R 36	157
R 37	157
R 38	157
R 39	157
R 40	163

SYMBOL NO.	INDEX NO.
R 41	162
R 42	180
R 43	177
R 44	166
R 45	179
R 46	177
R 47	173
R 48	155
R 49	165
R 50	157

SYMBOL NO.	INDEX NO.
R 51	161
R 52	157
R 53	163
R 54	163
R 55	194
R 56	165
R 57	----
R 58	----
R 59	----
R 60	----

SYMBOL NO.	INDEX NO.
R 61	166
R 62	166
R 63	166
R 64	166
R 65	166
R 66	166
R 67	166
R 68	166
R 69	166
R 70	166

SYMBOL NO.	INDEX NO.
R 71	166
R 72	166
R 73	166
R 74	166
R 75	166
R 76	166
R 77	166
R 78	166
R 79	166
R 80	166

SYMBOL NO.	INDEX NO.
R 81	162
R 82	167
R 83	166
R 84	157
R 85	166
R 86	166
R 87	166
R 88	166
R 89	166
R 90	165

SYMBOL NO.	INDEX NO.
R 91	157
R 92	156
R 93	155
R 94	156
R 95	156
R 96	175
R 97	156
R 98	166
R 99	157
R 100	166

RESISTOR

SYMBOL NO.	INDEX NO.
R 101	157
R 102	157
R 103	166
R 104	166
R 105	157
R 106	166
R 107	157
R 108	166
R 109	157
R 110	157

SYMBOL NO.	INDEX NO.
R 111	166
R 112	166
R 113	157
R 114	157
R 115	166
R 116	166
R 117	157
R 118	166
R 119	157
R 120	163

SYMBOL NO.	INDEX NO.
R 121	163
R 122	174
R 123	181
R 124	172
R 125	157
R 126	157
R 127	156
R 128	166
R 129	166
R 130	176

SYMBOL NO.	INDEX NO.
R 131	157
R 132	157
R 133	157
R 134	157
R 135	157
R 136	157
R 137	157
R 138	157
R 139	157
R 140	157

SYMBOL NO.	INDEX NO.
R 141	157
R 142	157
R 143	157
R 144	157
R 145	157
R 146	157
R 147	157
R 148	157
R 149	157
R 150	166

SYMBOL NO.	INDEX NO.
R 151	166
R 152	157
R 153	194
R 154	194
R 155	194
R 156	194
R 157	194
R 158	194
R 159	194
R 160	194

SYMBOL NO.	INDEX NO.
R 161	194
R 162	157
R 163	165
R 164	156
R 165	156
R 166	156
R 167	156
R 168	157
R 169	157
R 170	157

36.MAIN CONTROL BOARD (A212/A214)

RESISTOR

SYMBOL NO.	INDEX NO.
R 171	158
R 172	166
R 173	166
R 174	166
R 175	157
R 176	157
R 177	157
R 178	155
R 179	157
R 180	156

SYMBOL NO.	INDEX NO.
R 181	166
R 182	156
R 183	157
R 184	156
R 185	157
R 186	157
R 187	157
R 188	157
R 189	157
R 190	157

SYMBOL NO.	INDEX NO.
R 191	157
R 192	157
R 193	157
R 194	157
R 195	157
R 196	157
R 197	157
R 198	157
R 199	157
R 200	157

SYMBOL NO.	INDEX NO.
R 201	157
R 202	157
R 203	166
R 204	166
R 205	165
R 206	166
R 207	157
R 208	166
R 209	166
R 210	166

SYMBOL NO.	INDEX NO.
R 211	166
R 212	166
R 213	166
R 214	166
R 215	166
R 216	166
R 217	166
R 218	166
R 219	166
R 220	166

SYMBOL NO.	INDEX NO.
R 221	166
R 222	166
R 223	166
R 224	166
R 225	166
R 226	166
R 227	160
R 228	166
R 229	160
R 230	166

SYMBOL NO.	INDEX NO.
R 231	166
R 232	160
R 233	166
R 234	160
R 235	157
R 236	166
R 237	166
R 238	157
R 239	166
R 240	166

RESISTOR

SYMBOL NO.	INDEX NO.
R 241	157
R 242	157
R 243	157
R 244	157
R 245	166
R 246	159
R 247	166
R 248	157
R 249	157
R 250	166

SYMBOL NO.	INDEX NO.
R 251	166
R 252	157
R 253	166
R 254	157
R 255	166
R 256	157
R 257	166
R 258	157
R 259	166
R 260	157

SYMBOL NO.	INDEX NO.
R 261	157
R 262	166
R 263	157
R 264	166
R 265	166
R 266	157
R 267	157
R 268	166
R 269	157
R 270	156

SYMBOL NO.	INDEX NO.
R 271	168
R 272	168
R 273	157
R 274	156
R 275	168
R 276	168
R 277	157
R 278	157
R 279	157
R 280	163

SYMBOL NO.	INDEX NO.
R 281	157
R 282	157
R 283	157
R 284	157
R 285	157
R 286	157
R 287	157
R 288	157
R 289	157
R 290	157

SYMBOL NO.	INDEX NO.
R 291	157
R 292	157
R 293	157
R 294	157
R 295	157
R 296	157
R 297	157
R 298	164
R 299	----
R 300	----

SYMBOL NO.	INDEX NO.
R 301	166
R 302	166
R 303	157
R 304	157
R 305	166
R 306	166
R 307	----
R 308	157
R 309	157
R 310	157

36.MAIN CONTROL BOARD (A212/A214)

RESISTOR

SYMBOL NO.	INDEX NO.
R 311	157
R 312	157
R 313	157
R 314	157
R 315	----
R 316	157
R 317	157
R 318	157
R 319	157
R 320	157

SYMBOL NO.	INDEX NO.
R 321	157
R 322	157
R 323	157
R 324	166
R 325	157
R 326	157
R 327	----
R 328	166
R 329	166
R 330	----

SYMBOL NO.	INDEX NO.
R 331	166
R 332	166
R 333	166
R 334	166
R 335	166
R 336	166
R 337	166
R 338	---
R 339	166
R 340	166

SYMBOL NO.	INDEX NO.
R 341	166
R 342	166
R 343	166
R 344	166
R 345	166
R 346	157
R 347	166
R 348	166
R 349	169
R 350	165

SYMBOL NO.	INDEX NO.
R 351	166
R 352	157
R 353	193
R 354	160
R 355	----
R 356	166
R 357	----
R 358	----
R 359	----
R 360	----

SYMBOL NO.	INDEX NO.
R 361	174
R 362	172
----	----
R 405	150
----	----
R 579	150
----	----
R 600	151

ZD

SYMBOL NO.	INDEX NO.
ZD 1	200
ZD 2	199
ZD 3	199
ZD 4	199

36.MAIN CONTROL BOARD (A212/A214)

Index No.	Part No.	Description	Q'ty Per Assembly
*	A212 5101	Main Control Board (115V)	1
*	A212 5201	Main Control Board (230V)	1
1	A069 5168	Heat Sink - Motor Board	1
2	A153 5114	Ram Board	1
3	A204 5117	IC - RF5A230	1

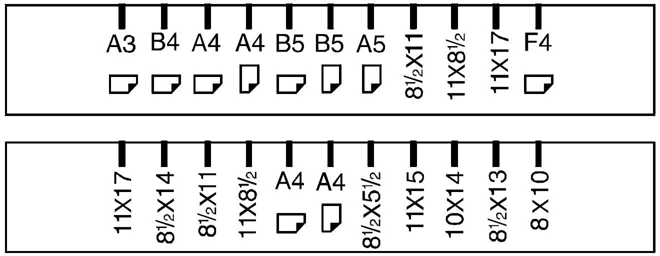
Index No.	Part No.	Description	Q'ty Per Assembly
102	1102 4202	Connector - 3p	
103	1102 4205	CT Header- 6p	
104	1102 4206	Connector - 7p	
105	1102 4207	Connector - 8p	
106	1102 4208	Connector - 9p	
107	1102 4210	Connector - 11p	
108	1102 4211	CT Header - 12p	
109	1102 4212	CT Header - 15p	
110	1102 4497	Connector - 13p	
111	1102 4619	Connector - 2p	
112	1102 4620	CT Header - 3p	
113	1102 4621	CT Header - 4p	
114	1102 4623	CT Connector - 6p	
115	1102 4624	CT Connector - 7P	
116	1102 4625	CT Connector 8p	
117	1102 4628	Connector - 11p	
118	1102 4629	Connector - 12P	
119	1102 4630	CT Connector	
120	1102 4637	CT Connector - 8P	
121	1102 4639	CT Connector - 10P	
122	1102 4640	Connector - 11p	
123	1102 4642	CT Connector - 15p	
124	1102 4643	CT Connector - 2p	
125	1102 5007	CT Header - 14p	
126	1102 5305	Connector - 6P	
127	1102 5605	Connector - 13P	
128	1102 5718	Optical Fiber Connector	
129	1102 6408	Connector - 30P	
130	1102 6762	CT Connector - 13p	
131	1103 1772	Pin Header - 6p	
132	1103 1774	Pin Header - 8p	
134	1400 0369	Transistor - 2sa1213y	
135	1400 0558	Transistor - 2sd780	
138	1402 1030	Diode - 1SS250	
140	1407 2187	TTLIC - SN74LS07NS	

Index No.	Part No.	Description	Q'ty Per Assembly
141	1407 2231	IC - TD62308AF	
142	1407 3173	Driver - 16bit - M66311fp	
143	1407 3708	IC - SLA7026M	
144	1407 4164	IC - MMID75XF	
145	1407 4316	IC - TD52308BF	
146	1407 4686	IC - M54992FP	
147	1408 0595	IC - NJM2904M	
148	1408 0874	Transistor Array - M54587fp	
149	1408 0877	Comparator - LM339NS	
150	1600 1499	Resistor - 0.33 OME ±2% 2W	
151	1600 1660	Resistor - ERG2SJ101	
152	1602 7032	Filter - Emi - 2200pF	
153	1604 4511	Capacitor - 0.15μF±10% 50V	
155	1630 3101	Resistor - 100Ω - 1/10W	
156	1630 3102	Resistor - 1KΩ 1/10W ±5%	
157	1630 3103	Resistor - 10KΩ 1/10W ±5%	
158	1630 3104	Resistor - 100K Ω 1/10W ±5	
159	1630 3105	Resistor - 1M Ω ±5% 1/10W	
160	1630 3222	Resistor - 2.2KΩ 1/10W ±5%	
161	1630 3223	Resistor - 22kΩ - 1/10W	
162	1630 3242	Resistor - 2.4K Ω ±5% 1/10W	
163	1630 3330	Resistor - 33 Ω ±5% 1/10W	
164	1630 3334	Resistor - 330K Ω ±5% 1/10	
165	1630 3393	Resistor - 39K Ω 1/10W	
166	1630 3472	Resistor - 4.7KΩ 1/10W ±5%	
167	1630 3473	Resistor - 47KΩ 1/10W ±5%	
168	1630 3680	Resistor - 68 Ω ±5% 1/10W	
169	1630 3682	Resistor - 6.8KΩ - 1/10W	
170	1630 3824	Resistor - 820KΩ ±5% 1/10W	
172	1633 1000	Resistor - 100Ω±1% 1/10W	
173	1633 1002	Resistor - 10K Ω ±1% 1/10W	
174	1633 2150	Resistor - 215Ω ±1% 1/10W	
175	1633 4701	Resistor - 4.7K Ω ±1% 1/10W	

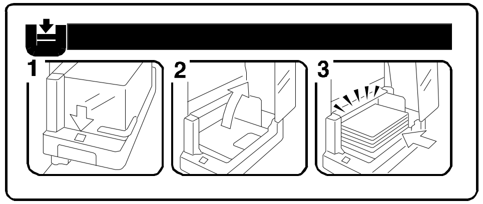
Index No.	Part No.	Description	Q'ty Per Assembly
176	1633 4702	Resistor - 47K Ω ± 1/10W	
177	1633 4871	Resistor - 4.87K Ω±1%:1/10W	
178	1633 5231	Resistor - 5.23K Ω ±1% 1/1	
179	1633 6340	Resistor - 634K Ω ±1% 1/10W	
180	1633 6490	Resistor - :649Ω:±1%:1/10W	
181	1633 8209	Resistor - 820Ω ±1% 1/10W	
182	1660 7104	Capacitor - 100000pF 50V	
183	1503 0585	Osillator - TQC-254A-6R(32MHZ)	
184	1002 0307	Jumper Wire	
185	1642 5100	Capacitor - 10μF±20% 50V	
186	1640 5470	Capacitor - 47μF±20% 50V	
187	1640 5101	Capacitor - 100μF±20% 50V	
188	1660 1100	Capacitor - 10pF 50V	
189	1660 3101	Capacitor - 100pF 50V	
190	1606 1139	Capacitor - 0.01μF±20%	
191	1660 3471	Capacitor - 470pF 50V	
192	1660 5222	Capacitor - 2200pF ±10% 50V	
193	1630 1101	Resistor - 100 Ω 1/4W ±5%	
194	1630 1161	Resistor - 160Ω ±5% 1/8W	
195	1104 0271	IC SOCKET - 28P	
196	1104 0612	Connector - 40P	
197	1102 3822	Connector - 20P	
199	1402 0478	Diode - 1SS226TE85L	
200	1402 0277	Zener Diode - 1Z12	
201	1402 0688	Diode	
202	1407 3257	CMOSIC - TC74HC14AF	
203	1408 1135	IC - X9C104S	
204	1905 0024	IC - WEPROM 4M X 16 100NS	
205	1408 0629	IC - 78M12A	

37.DECAL AND DOCUMENT (A212/A214)

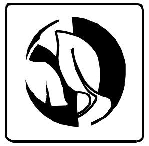
1


A3
B4
A4
A4
B5
B5
A5
8½X11
11X8½
11X17
F4
11X17
8½X14
8½X11
11X8½
A4
A4
8½X5½
11X15
10X14
8½X13
8 X10

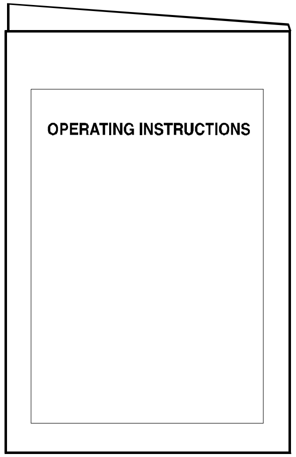
3



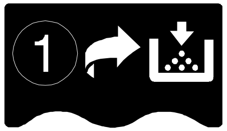
4



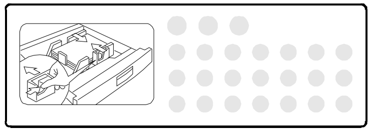
6


OPERATING INSTRUCTIONS

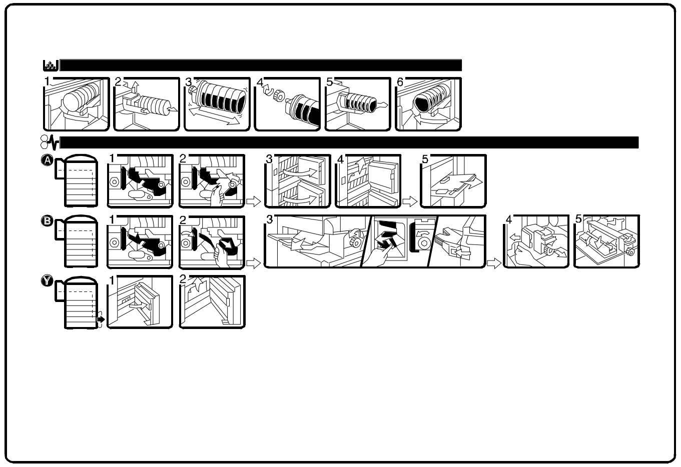
20



21



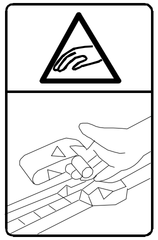
22


1
2
3
4
5
6
A
1
2
3
4
5
B
1
2
3
4
5
Y
1
2

23

- Push the paper tray in gently.
- Refermer la cassette papier avec precaution.
- Die Papierkassette vorsichtig hinein schieben.
- Inserire il cassetto carta con delicatezza.
- Empujar el cassette de papel con suavidad. >PS<

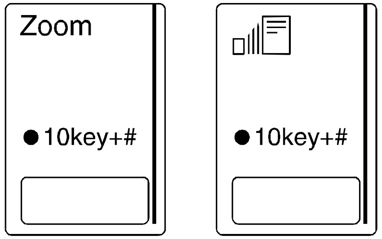
24



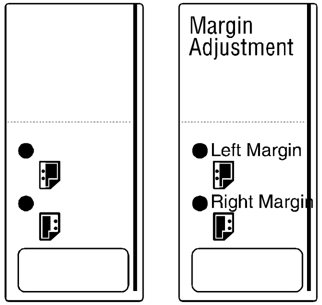
25

This device complies with Part 15 of the FCC Rules.
Operation is subject to the following two conditions:
(1)this device may not cause harmful interference,and
(2)this device must accept any interference received,
including interference that may cause undesired operation.

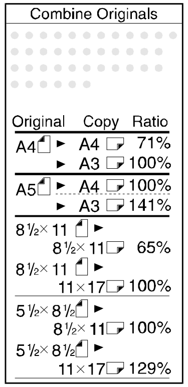
7


Zoom
●10key+#
●10key+#

8

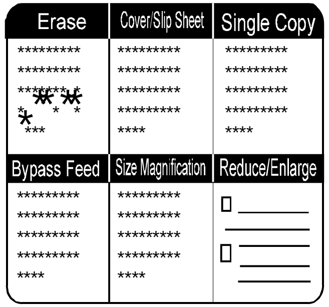

Margin Adjustment
●Left Margin
●Right Margin

9

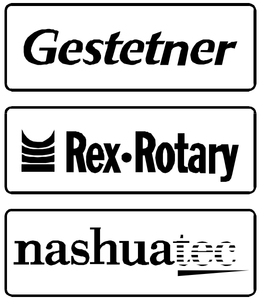

Combine Originals

Original	Copy	Ratio
A4 ►	A4	71%
►	A3	100%
A5 ►	A4	100%
►	A3	141%
8½×11 ►	8½×11	65%
8½×11 ►	11×17	100%
5½×8½ ►	8½×11	100%
5½×8½ ►	11×17	129%

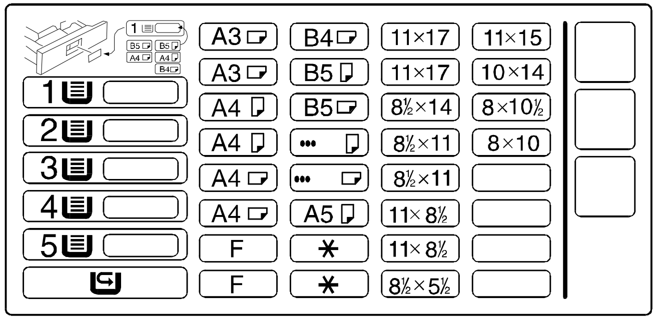
10


Erase
Cover/Slip Sheet
Single Copy
Bypass Feed
Size Magnification
Reduce/Enlarge

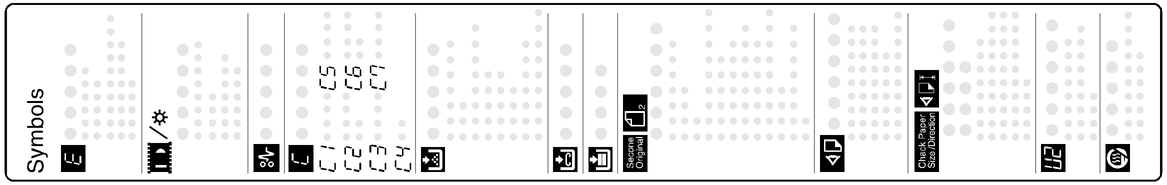
11


Gestetner
Rex-Rotary
nashuatec

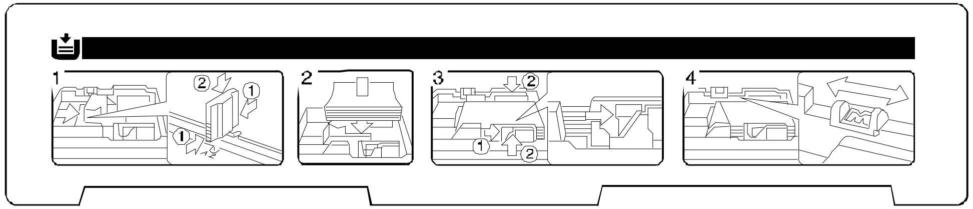
12


1
B5
B5
A4
A4
B4
1
2
3
4
5
A3
B4
11×17
11×15
A3
B5
11×17
10×14
A4
B5
8½×14
8×10½
A4
8½×11
8×10
A4
8½×11
A4
A5
11×8½
F
✱
11×8½
F
✱
8½×5½

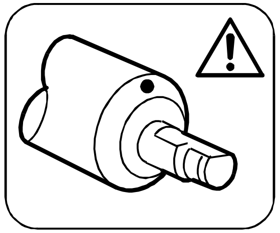
14


Symbols
Second Original
Check Paper Size/Direction

17

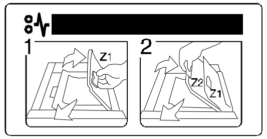

1
②
①
①
2
3
②
①
②
4

15

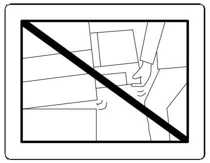


16

18



19



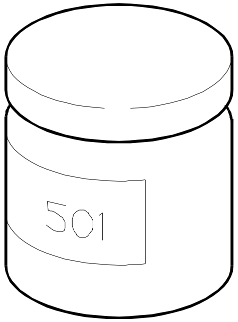
37.DECAL AND DOCUMENT (A212/A214)

Index No.	Part No.	Description	Q'ty Per Assembly
1	A153 2995	Decal Paper Size - LT/DLT	1
1	A153 2996	Decal Paper Size - A4/A3	1
3	A155 6113	Decal - Paper Set	1
4	A153 1285	Emblem (RIC)	1
4	A156 6413	Emblem (SVN)	1
4	A153 6423	Support Cover (INF)	1
6	A212 8607	Operating Instructions English LT (RIC)	1
6	A212 8650	Operating Instructions - English LT (SVN)	1
6	A212 8661	Operating Instructions - German (INF)	1
6	A212 8662	Operating Instructions - French (INF)	1
6	A212 8663	Operating Instructions - Italian(INF)	1
6	A212 8664	Operating Instructions - Spanish(INF)	1
6	A212 8660	Operating Instructions - English A4 (INF)	1
6	A212 8690	Operating Instructions - English A4 (NRG)	1
6	A212 8697	Operating Instructions - English LT (NRG)	1
6	A212 8608	Operating Instructions - English A4 (RIC)	1
7	A153 1475	Decal - 10key Zoom -LT/DLT	1
7	A153 1478	Decal - 10key Zoom - A4/A3	1
8	A153 1476	Decal - Margin Adjustment - LT/DLT	1
8	A153 1479	Decal - Margin Adjustment - A4/A3	1
9	A156 1495	Decal Copy Ratio	1
10	A212 1495	Operation Sheet (LT)	1
10	A212 1485	Operation Sheet (A4)	1
11	C225 2867	Decal - Cover - Panel - Nashua	1
11	C225 2866	Decal - Key Top Cover	1
11	A153 6409	Decal - Keytop Cover	1
12	AA00 2209	Decal - Paper Size	1
13	A212 6404	Decal - Model Name - GES (A212)	1
13	A212 6407	Decal - Model Name ST (A212)	1
13	A212 6414	Decal - Model Name - REX (A212)	1
13	A214 6404	Decal - Model Name - GES (A214)	1
13	A212 6407	Decal - Model Name - NST (A214)	1
13	A212 6414	Decal - Model Name - REX (A214)	1
14	A153 1365	Symbol Explanation Decal	1
15	A204 2155	Decal - Caution	1

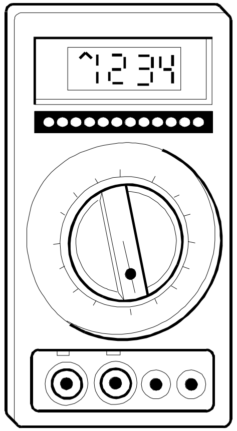
Index No.	Part No.	Description	Q'ty Per Assembly
16	AA00 1389	Large Decal - Energy Star	1
17	A212 2758	Decal - Paper Setting	1
18	A134 4884	Decal - Duplex Misfeed Removal	1
19	A155 6114	Caution Decal - LCT	1
20	A212 3081	Decal - Toner Supply	1
21	A212 2805	Tray Bottom Plate Sheet	1
22	A157 1360	Operation Sheet (A212)	1
22	A158 1360	Operation Sheet (A214)	1
23	A219 2692	Decal - Operation Instructions	1
24	A153 3929	Decal - Caution Lever	1
25	AA00 1381	Decal - FCC/15-B CS CLASS-A	1

38.SPECIAL TOOLS (A212/A214)

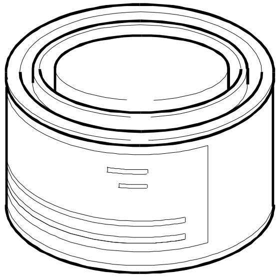
1



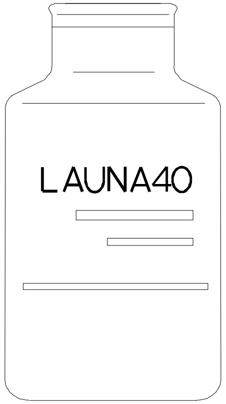
2



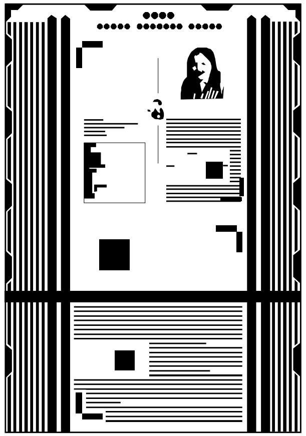
3



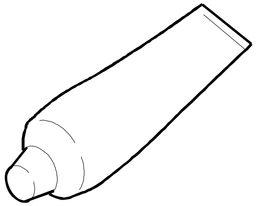
4



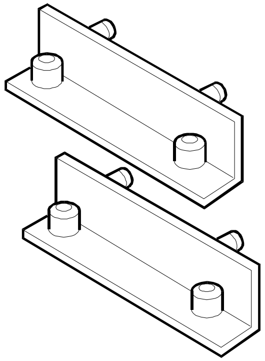
5



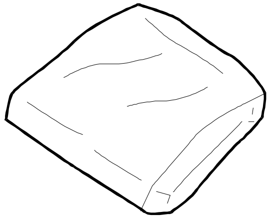
6



7



8



38.SPECIAL TOOLS (A212/A214)

Index No.	Part No.	Description	Q'ty Per Assembly
1	5203 9501	Grease 501	1
2	5420 9507	Digital Multimeter - Beckman	1
3	5447 9078	Heat Resisting Grease MT-78	1
3	A028 9300	Grease Nok Barrierta - JFE 5 5/2	1
4	5442 9103	Launa Oil	1
5	5420 9516	Test Chart - OS -A3 (10PCS/SET)	1
6	A008 9502	Silicone Grease - G40M.	1
7	A153 9001	Scanner Adjustment Tool	2
8	A153 9004	Wiping Cloth	1

Index No.	Part No.	Description	Q'ty Per Assembly

PARTS INDEX

PM Parts Index

Section Name	Part No.	Description in Service Manual	Description in Parts Catalog	Q'ty Per Assembly	Page and Index No
BY-PASS FEED SECTION (A212/A214)	5447 2927	Friction Pad - B	Friction Pad - B	1	15- 12
PAPER TRAY SECTION (A212/A214)	G020 2645	Friction Pad	Friction Pad	1	17- 13
LCT UNIT 1 (A214)	A421 2543	Friction Pad	Friction Pad	1	19- 13
PAPER FEED SECTION 1 (A212/A214)	AF03 1025	Feed Roller	Feed Roller	1	23- 7
	AF03 0024	Pick-up Roller	Pick-up Roller	1	23- 10
	AF03 2025	Separation Roller	Separation Roller	1	23- 21
PAPER FEED SECTION 2 (A212/A214)	G020 2555	Paper Feed Roller	Paper Feed Roller	4	25- 8
DRUM UNIT 1 (A212/A214)	A153 2135	Charge Roller Terminal Ass'y	Charge Roller Terminal Ass'y	1	41- 8
	AD02 7004	Charge Roller	Charge Roller	1	41- 13
	A204 2120	Drum Charge Roller Cleaner	Drum Charge Roller Cleaner	1	41- 25
DRUM UNIT 2 (A212/A214)	AD02 5019	Drum Pick-off Pawl	Drum Pick-off Pawl	1	43- 2
	A153 2277	Cleaning Blade	Cleaning Blade	1	43- 39
TRANSFER UNIT (A212/A214)	A157 3861	Transfer Belt	Transfer Belt	1	45- 2
	A153 3892	Belt Cleaning Blade	Belt Cleaning Blade	1	45- 17
FUSING UNIT 1 (A212/A214)	AE04 4019	Hot Roller Stripper	Hot Roller Stripper	5	47- 20
	AE01 1024	Hot Roller	Hot Roller	1	47- 22
FUSING UNIT 2 (A212/A214)	AE04 2030	Cleaning Roller	Cleaning Roller	1	49- 12
	AE02 0050	Pressure Roller	Pressure Roller	1	49- 15
DUPLEX TRAY 2 (A214)	AF03 1024	Feed Roller	Feed Roller	1	53- 17
DUPLEX TRAY 4 (A214)	AF01 3003	Bottom Plate Pad - Duplex	Bottom Plate Pad - Duplex	1	57- 2

Part No.	Description	Page and Index No.
A212 1073	Stopper Bracket	25- 2
A212 1087	Middle Upper Stay	25- 17
A212 1088	Middle Lower Stay	77- 19
A212 1099	Stopper	25- 1
A212 1111	Spring Cover	65- 18
A212 1151	Tension Spring	63- 19
A212 1151	Tension Spring	65- 17
A212 1258	Right Bracket - Platen Ccover	73- 10
A212 1261	Front Right Cover	9- 28
A212 1271	Rear Right Cover (A212)	9- 27
A212 1282	Front Cover (A212)(RIC)	9- 2
A212 1291	Rear Cover	9- 25
A212 1302	Left Cover	9- 16
A212 1323	Operation Panel Ass'y - LT (A212)	9- 12
A212 1323	Operation Panel Ass'y - LT (A212)	13- *
A212 1324	Operation Panel Ass'y - A4 (A212)	9- 12
A212 1324	Operation Panel Ass'y - A4 (A212)	13- *
A212 1328	Operation Panel Ass'y (A212)(SVN)	9- 12
A212 1328	Operation Panel Ass'y - LT (A212)(SVN)	13- *
A212 1350	Right Middle Cover	75- 24
A212 1352	Inner Cover - Right Lower	9- 7
A212 1465	Key-top - Sorter (SVN)	13- 18
A212 1481	Operation Panel Case - A4	13- 22
A212 1482	Display Panel - A4 (A212)	13- 24
A212 1483	Sorter Sheet - A4 (A212)	13- 16
A212 1485	Operation panel Sheet - A4	9- 31
A212 1485	Operation Sheet (A4)	83- 10
A212 1487	Sorter Sheet (A212)(SVN)	13- 16
A212 1491	Operation Panel Case - LT	13- 22
A212 1492	Display Panel - LT (A212)	13- 24
A212 1493	Sheet Sorter - LT (A212)	13- 16
A212 1494	Operation Panel Sheet	13- 23
A212 1495	Operation Panes Sheet - LT	13- 17
A212 1495	Operation Sheet (LT)	83- 10

Part No.	Description	Page and Index No
A212 1674	Shield Glass Guide	75- 19
A212 1695	Tension Spring	35- 12
A212 1707	Tension Bracket - Long	35- 14
A212 1708	Tension Bracket - Short	35- 6
A212 1710	Timing Pulley - 44Z	35- 16
A212 1807	Harness Guide	33- 2
A212 1840	Lens Magnification Unit	29- 1
A212 1841	Lens Drive Unit	29- 11
A212 1903	3rd Scanner Bracket	33- 28
A212 1914	3rd Scanner Rack	33- 19
A212 1981	Scaner Home Sensor Bracket	33- 29
A212 2060	Wire Pulley	75- 13
A212 2071	Cam Lever	75- 15
A212 2101	Release Spring	75- 3
A212 2102	Pressure Spring	75- 2
A212 2110	Charge Roller Ass'y	41- 2
A212 2131	Idle Gear 14z	41- 16
A212 2132	Idle Gear 20z	41- 17
A212 2142	Cam Lever	65- 32
A212 2251	Pressure Blade Spring	43- 8
A212 2252	Pressure Roller Spring	41- 10
A212 2255	Drum Unit	43- 1
A212 2351	Rear Roller Bushing	41- 5
A212 2352	Rear Roller Housing	41- 11
A212 2353	Gront Roller Bushint	41- 18
A212 2354	Pad Pressure Spring	43- 11
A212 2524	Spring	25- 13
A212 2531	Timing Belt - S3M 300	67- 8
A212 2533	Paper Tray Ass'y (LT)	17- *
A212 2534	Paper Size Sensor Board	15- 7
A212 2537	Bushing	27- 7
A212 2538	Bushing	27- 17
A212 2539	Spring - Registration Roller	27- 5
A212 2542	Bottom Plate Ass'y	17- 12

Part No.	Description	Page and Index No.
A212 2547	Rear Side Fence Ass’y	17- 17
A212 2550	Vertical Guide Plate	27- 18
A212 2551	Lower Guide Plate	27- 8
A212 2552	Vertical Relay Guide Plate	27- 6
A212 2558	Upper Resistration Guide	27- 19
A212 2559	Switch Bracket	19- 29
A212 2559	Switch Bracket	15- 17
A212 2562	Solenoid Bracket	67- 23
A212 2563	Lower Registration Guide	27- 3
A212 2564	Tightener	67- 11
A212 2567	Rear Side Fence	17- 18
A212 2570	Paper Feed Roller Ass’y (EU/ASIA/TWN)	25- 10
A212 2571	Vertical Transport Guide (A212)	15- 22
A212 2575	Shaft - Paper Feed Roller (EU/ASIA/TWN)	25- 6
A212 2580	Vertical Transfer Hinge (A212)	27- 11
A212 2581	Front Side Fence Ass’y	17- 3
A212 2582	Front Corner Separator	17- 8
A212 2583	Rear Corner Separator	17- 21
A212 2584	Paper Feed Drive Shaft	67- 21
A212 2586	Hinge Bracket (A212)	15- 14
A212 2587	Feed Roller Bushing - Front	25- 3
A212 2590	Paper Tray	17- 32
A212 2591	Vertical Transfer (A212)	15- 16
A212 2652	Middle Guide Rail	77- 15
A212 2658	Pick-up Arm	23- 30
A212 2659	By-pass Feed Housing	23- 15
A212 2660	Paper End Feeler	23- 2
A212 2661	Adjusting Plate - Front	17- 4
A212 2663	Separation Guide	23- 20
A212 2670	Rear Guide Plate	23- 19
A212 2671	By-pass Feed Cover	23- 4
A212 2672	Pressure Spring	67- 7
A212 2673	Release Spring	67- 4
A212 2692	By-pass Feed Table Ass’y	15- 1

Part No.	Description	Page and Index No
A212 2697	By-pass Feed Table	15- 5
A212 2705	Magnet Catch Plate	15- 6
A212 2706	Rear Fence Rack	15- 8
A212 2707	Front Fence Rack	15- 10
A212 2711	Front Side Fence	15- 2
A212 2716	Rear Side Fence	15- 3
A212 2746	By-pass Feed Cover	15- 11
A212 2757	Paper Tray Ass’y (A4)	17- *
A212 2758	Decal - Paper Setting	83- 17
A212 2758	Decal - Paper Set Ditection	17- 2
A212 2765	Spring Plate - Gear Side Fence	17- 16
A212 2769	Rear Stopper Spring	17- 6
A212 2802	Feeler Paper End Sensor	25- 4
A212 2805	Tray Bottom Plate Sheet	83- 21
A212 2805	Tray Bottom Plate Sheet	17- 33
A212 2822	Left Slide Rail Ass’y	77- 1
A212 2823	Right Slide Rail Ass’y	77- 12
A212 2844	End Fence Ass’y	17- 9
A212 2870	Adjusting Plate Rear	17- 20
A212 2871	Adjusting Plate Front	17- 7
A212 2905	Release Arm - Paper End	25- 14
A212 2929	Right Rail - Feed Tray	77- 17
A212 2956	Paper Feed Front Cover	17- 1
A212 2982	Paper Lift Shutter	17- 31
A212 3051	Development Unit	39- 1
A212 3056	Coupled Gear - 15z/22z	39- 25
A212 3057	Gear - 17Z	39- 24
A212 3058	Gear - 26Z	39- 26
A212 3063	Paddle Roller	39- 14
A212 3068	Toner Bottle Holder	37- 15
A212 3071	Deveropper Rail Seal	69- 18
A212 3072	Relay Adjusting Spring	37- 31
A212 3072	Relay Adjusting Spring	67- 10
A212 3073	Chuck Spring	37- 8

Part No.	Description	Page and Index No.
A212 3078	Shutter Spring	37- 17
A212 3079	Toner Collection Coil	39- 10
A212 3081	Decal - Toner Supply	83- 20
A212 3087	Terminal Cap	65- 11
A212 3090	Development Position Plate	39- 4
A212 3150	Toner Supply Unit (RIC-EU)	37- *
A212 3151	Toner Supply Unit (RIC-NA)	37- *
A212 3153	Toner Supply Unit (OEM/RIC-AA)	37- *
A212 3157	Bottole Holder Bracket	37- 27
A212 3172	Shutter	37- 19
A212 3173	Shutter Guide	37- 16
A212 3174	Shutter Holder	37- 18
A212 3177	Toner Slider	37- 4
A212 3179	Chuck Shaft	37- 7
A212 3185	Toner Supply Gear (RIC-EU)	37- 1
A212 3187	Toner Supply Gear (RIC-NA)	37- 1
A212 3189	Toner Supply Gear (OEM/RIC-AA)	37- 1
A212 3190	Toner Bottle Stopper	37- 10
A212 3197	Bottle Holder	37- 13
A212 3200	Toner Hopper Ass’y	39- 21
A212 3270	Stay - Toner Supply	69- 17
A212 3281	Bottle Bracket Cover	37- 14
A212 3580	Toner Collection Unit	41- 23
A212 3590	ADS Plate	43- 19
A212 3595	Pick-off Pawl Retainer	43- 3
A212 3850	Transfer Unit	45- 1
A212 3851	Spring - T/S Unit	45- 20
A212 3851	Spring - T/S Unit	65- 35
A212 3853	Bias Roller Bushing - Rear	45- 11
A212 3862	Transfer Belt Frame	45- 7
A212 3863	Front Side Plate	45- 4
A212 3865	Belt Drive Gear - 25z	45- 10
A212 3876	Rear Side Plate	45- 9
A212 3882	Transfer Belt Casing	45- 31

Part No.	Description	Page and Index No
A212 3883	Toner Collection Cap	45- 29
A212 3884	Belt Guide Plate	45- 14
A212 3886	Belt Pressure Lever	45- 19
A212 3887	Belt Release Stay	45- 21
A212 3888	Earth Plate	45- 30
A212 3894	Bushing	45- 16
A212 3895	Bushing	45- 22
A212 3901	Entrance Guide Plate	45- 27
A212 3914	Magnetic Clutch Feeler	65- 28
A212 3930	Belt Unit Handle	77- 8
A212 4005	Fusing Unit (NA)	47- *
A212 4006	Fusing Exit Unit	49- 1
A212 4007	Fusing Unit (EU/ASIA/TWN)	47- *
A212 4053	Fusing Upper Stay	47- 2
A212 4103	Solenoid Spring	47- 18
A212 4110	Fuser Stripper Ass’y	47- 27
A212 4130	Fusing Front Cover	47- 1
A212 4151	Fusing Unit Frame	49- 20
A212 4205	Cleaning Roller Bracket	49- 8
A212 4301	Exit Plate	49- 17
A212 4326	Exit Roller Ass’y	49- 6
A212 4352	Fusing Lock Lever	77- 2
A212 4450	Upper Guide Plate	59- 15
A212 4450	Upper Guide Plate	61- 11
A212 4459	Pressure Spring	49- 19
A212 4460	Exit Cover	61- 12
A212 4467	Spring - Stripper Pawl Release	69- 8
A212 4467	Spring - Stripper Pawl Release	77- 3
A212 4495	Shift Clutch	59- 8
A212 4495	Shift Clutch	61- 2
A212 4496	Gear - 24Z	61- 14
A212 4496	Gear - 24Z	59- 6
A212 5101	Main Control Board (115V)	81- *
A212 5101	Main Control Board (NA)	71- 2

Part No.	Description	Page and Index No.
A212 5103	IC - 4MX16 - 120NS	71- 4
A212 5132	Density Sensor	43- 18
A212 5160	ADS Board	33- 18
A212 5201	Main Control Board (230V)	81- *
A212 5201	Main Control Board (EU/ASIA/TWN)	71- 2
A212 5312	Optical Harness	71- 13
A212 5316	Paper Feed Harness -2trays (A212)	71- 14
A212 5319	Rear Upper Harness	71- 5
A212 5320	Front Right Harness (EU/ASIA/TWN)	69- 5
A212 5324	Sorter Relay Harness	73- 12
A212 5333	CT Harness	27- 16
A212 5334	CT Harness - 7p	77- 11
A212 5393	Optical Harness 3	33- 23
A212 5460	Operation Panel Board - LT (A212)	13- 1
A212 5465	Operation Panel Board - A4 (A212)	13- 1
A212 5520	Front Right Harness (NA)	69- 5
A212 5661	AC Main Harness	69- 3
A212 5804	Main Switch Bracket (EU/ASIA/TWN)	69- 19
A212 5807	Bracket Ardf	71- 20
A212 5810	Power Supply Cord Bracket	73- 17
A212 5811	Main Control Board Bracket	71- 1
A212 5814	Main Switch Bracket (NA)	69- 19
A212 5820	Total Counter Bracket	69- 11
A212 5829	Decal - Main Switch Cover (EU/ASIA/TWN)	9- 10
A212 5830	Decal - Main Switch (EU/ASIA/TWN)	9- 32
A212 6404	Decal - Model Name - GES (A212)	9- 30
A212 6404	Decal - Model Name - GES (A212)	83- 13
A212 6407	Decal - Model Name - NST (A212)	83- 13
A212 6407	Decal - Model Name - NST (A214)	83- 13
A212 6407	Decal - Model Name - NSA (A212)	9- 30
A212 6412	Front Cover (A212)(SVN)	9- 2
A212 6414	Decal - Model Name - REX (A214)	83- 13
A212 6414	Decal - Model Name - REX (A212)	83- 13
A212 6414	Decal - Model Name - REX (A212)	9- 30

Part No.	Description	Page and Index No
A212 6422	Front Cover (A212)(INF)	9- 2
A212 8607	Operating Instructions - English LT (RIC)	83- 6
A212 8608	Operating Instructions - English A4 (RIC)	83- 6
A212 8650	Operating Instructions - English LT (SVN)	83- 6
A212 8660	Operating Instructions - English A4 (INF)	83- 6
A212 8661	Operating Instructions - German (INF)	83- 6
A212 8662	Operating Instructions - French (INF)	83- 6
A212 8663	Operating Instructions - Italian(INF)	83- 6
A212 8664	Operating Instructions - Spanish(INF)	83- 6
A212 8690	Operating Instructions - English A4 (NRG)	83- 6
A212 8697	Operating Instructions - English LT (NRG)	83- 6
A212 8834	Operation panel Sheet - LT	9- 31

Part No.	Description	Page and Index No.
AA00 1381	Decal - FCC/15-B CSA CLASS-A	83- 25
AA00 1389	Large Decal - Energy Star	83- 16
AA00 1389	Large Decal - Energy Star (NA)	9- 33
AA00 2209	Decal - Paper Size	83- 12
AA01 2080	Dust Filter	9- 26
AA04 3374	Timing Belt - S2M800	57- 17
AA04 3386	Timing Belt - 40S2M1224	35- 2
AA04 3387	Timing Belt - 40S2M984	35- 1
AA04 3388	Timing Belt - 60S2M180	35- 11
AA04 3389	Timing Belt - 60S3M201	67- 13
AA04 3390	Timing Belt - 40S2M192	53- 3
AA04 3391	Timing Belt - 160S2M328	63- 6
AA04 3392	Drum Timing Belt	63- 3
AA04 3396	Timing Belt - 60S3M366	63- 15
AA04 3397	Timing Belt - 30S3M300	63- 18
AA04 3420	Timing Belt - 80S3M519	63- 4
AA04 3456	Timing Belt - S3M167	21- 12
AA05 0086	Lens Drive Wire - Horizontal	29- 20
AA05 0087	Lens Drive Wire - Vertical	35- 26
AA05 1024	Release Wire	69- 4
AA05 1024	Release Wire	63- 20
AA05 1025	Release Wire	75- 4
AA06 0228	Spring - Transfer Drum Cleaning Sol	63- 11
AA06 0593	Spring	55- 9
AA06 3239	Spring - Handle	19- 20
AA06 3367	Pressure Spring	37- 12
AA06 3370	Spring	57- 16
AA06 3499	Pressure Spring	23- 25
AA06 3523	Adjust Spring	33- 21
AA06 3532	Spring	73- 16
AA06 3538	Spring - 10mm	19- 40
AA06 3552	Pressure Spring	65- 20
AA06 6247	Spring	45- 23
AA06 6274	Spring	59- 12

Part No.	Description	Page and Index No
AA06 6274	Spring	61- 8
AA08 0034	Bushing - 4x5x7	19- 37
AA08 0037	Bushing - 6 mm	23- 24
AA08 0111	Bushing - 8x12x7	17- 23
AA08 0186	Bushing - 6mm	39- 11
AA08 0188	Bushing - 5mm	39- 7
AA08 0197	Rear Roller Bushing	41- 9
AA08 2047	Bushing - 8x16x7	27- 1
AA08 2047	Bushing - 8x16x7	65- 3
AA08 2047	Bushing - 8x16x7	67- 22
AA08 2061	Bias Roller Bushing - Front	45- 6
AA08 3010	Clutch Roller - 6x14x10	23- 13
AA11 1208	Paper End Sensor Feeler	53- 5
AA12 0067	Anti Static Brush	51- 16
AA12 0071	Exit Antistatic Brush	61- 4
AA12 0071	Exit Antistatic Brush	59- 16
AA13 2184	Motor Cushion	55- 16
AA13 2186	Collar	75- 8
AA14 0291	Bottom Plate Shaft	57- 6
AA14 0321	Pick-off Pawl Shaft	43- 4
AA14 0534	Feed Shaft	23- 11
AA14 0560	Joint Shaft	43- 20
AA14 0576	LCT Drive Shaft	21- 15
AA14 0599	Scanner Drive Shaft	35- 4
AA14 3025	Stepped Screw - M3	37- 22
AA14 3219	Stepped Screw	23- 3
AA14 3301	Stepped Screw - M3x4	71- 22
AA14 3307	Stepped Screw - M3x4	55- 17
AA14 3410	Stepped Screw - M4	37- 11
AA14 3416	Stepped Screw - M4x3	9- 19
AA14 3417	Shoulder Screw - M4x4	9- 22
AA14 3444	Stepped Screw	75- 26
AA14 3452	Stepped Screw	73- 14
AA14 3459	Knob Serew	37- 28

Part No.	Description	Page and Index No.
AA14 3712	Chuck Shaft	37- 5
AA14 3715	Stepped Screw - M5	47- 10
AA14 3730	Stepped Screw	41- 21
AA14 3744	Stepped Screw	41- 19
AA14 5539	Solenoid Shaft	65- 4
AA14 5794	Front Support Shaft	41- 20
AA14 5808	Rear Support Shaft	41- 12
AA14 8413	Idle Gear Shaft	37- 25
AA14 8447	Platen Cover Stud	11- 10
AA15 0367	Shielding Mylar	29- 22
AA15 0368	Shielding Plate - Cover - Lens	29- 4
AA15 0369	Original Sensor Seal	29- 2
AA15 0377	Shutter Seal	37- 20
AA15 0380	Seal Front Holder	43- 27
AA15 0381	Seal Rear Holder	43- 25
AA15 0382	Entrance Seal	39- 3
AA15 0389	Drum Guide Seal	43- 26
AA15 1144	Shield - Guide Plate	39- 6
AA15 1177	Seal - 5x82x4	73- 1
AA15 1809	Rear Seal	43- 7
AA15 1894	Seal - 67x53x2	37- 2
AA15 1935	Seal - 38x32x2.5	39- 23
AA15 1940	Left Upper Seal	39- 5
AA15 1941	Right Shield - Development Case	39- 17
AA15 1942	Side Seal	43- 13
AA15 1943	Front Seal	43- 6
AA15 1944	Rear Seal	43- 10
AA15 1945	Joint Seal	41- 22
AA15 2136	Shield - Development Roller	39- 8
AA15 2245	Front Drum Seal	43- 28
AA15 2246	Rear Drum Seal	43- 23
AA15 2330	Magnification Seal	29- 12
AA15 2332	Seal - 9x351	45- 15
AA16 1067	Cushion - Motor	55- 8

Part No.	Description	Page and Index No
AA16 1107	Cushion	43- 22
AA16 2067	Platen Cover Pad	11- 6
AA16 2068	Guide Plate Pad	51- 20
AB01 0341	Gear - 18Z	43- 40
AB01 0348	Gear - 20Z	41- 15
AB01 1133	Gear - 49Z	21- 14
AB01 1153	Idle Gear - 25Z	67- 14
AB01 1165	Gear - 32Z	55- 5
AB01 1166	Gear - 33Z	53- 11
AB01 1167	Gear - 25Z	55- 15
AB01 1343	Idle Gear - 23Z	23- 9
AB01 1344	Gear - 16Z	23- 27
AB01 1345	Gear - 20Z	23- 28
AB01 1346	Gear - 27Z	23- 31
AB01 1357	Collection Coil Gear	43- 17
AB01 1358	Driven Gear	41- 4
AB01 1359	Joint Drive Gear	43- 21
AB01 1360	Idle Gear	43- 34
AB01 1361	Drive Gear	43- 37
AB01 3106	Gear - Drive - Third - Z18	59- 23
AB01 3343	Gear - 22Z	39- 13
AB01 3868	Gear - 16Z	17- 15
AB01 3872	Fusing Cam Gear - 28Z	63- 14
AB01 3881	Gear - 31Z	57- 12
AB01 3882	Gear - 40Z	47- 23
AB01 3883	Idle Gear - 25Z	47- 3
AB01 3884	Exit Gear - 17z	49- 7
AB01 3885	Idle Gear - 20z	49- 5
AB01 3908	Gear - 27Z	67- 20
AB01 3909	Idle Gear	39- 9
AB01 3911	Gear	39- 12
AB01 3917	Toner Supply Gear	65- 2
AB01 3918	Drive Gear - 35Z	67- 15
AB01 7129	Gear - 20Z And 72Z	35- 17

Part No.	Description	Page and Index No.
AB01 7332	Gear - 24Z/41Z	55- 14
AB01 7337	Gear - 15Z/55Z	55- 4
AB01 7339	End Fence Gear - 22Z/58Z	57- 14
AB01 7345	Timing Pulley - 35Z	63- 17
AB01 7347	Idle Gear	37- 24
AB01 7360	Gear Pulley	29- 19
AB01 7360	Gear Pulley	35- 8
AB01 7361	Gear - 24Z/56Z	35- 18
AB01 7361	Gear - 24Z/56Z	29- 21
AB01 7362	Gear - 25Z/32Z	35- 7
AB01 7366	Paddle Gear	39- 15
AB01 7368	Cleaning Drive Gear	65- 7
AB01 7369	Transfer Belt Pulley	65- 22
AB01 7370	Development Pulley	65- 24
AB01 7371	Exit Pulley	63- 9
AB01 7373	Idle Cam	43- 16
AB01 7374	Drive Gear	43- 32
AB01 7375	Drive Gear	43- 31
AB01 7376	Separation Pawl Cam	43- 12
AB01 7377	Gear - 25Z	67- 18
AB01 7385	Gear - 17Z/24Z	65- 29
AB01 7386	Cleaning Cam	65- 1
AB01 7388	Blade Cam	43- 33
AB01 7394	Timing Pulley - 24T/20Z	67- 19
AB01 7395	Timing Pulley	67- 17
AB01 7400	Gear- 18Z/68Z	57- 13
AB03 0281	Timing Pulley - 28Z	21- 9
AB03 0463	Fusing Cam Pulley	63- 13
AB03 0473	End Fence Pulley - 22Z	57- 11
AB03 0474	Pulley - 24Z	53- 2
AB03 0486	Timing Pulley - 24Z	35- 9
AB03 0489	Timing Pulley - 22Z	35- 15
AB03 0491	Timing Pulley - 25Z	67- 9
AB03 0492	Pulley - 25/25/34/125Z	63- 5

Part No.	Description	Page and Index No
AB03 0494	Drum Pulley	65- 14
AB03 2059	Driven Pulley	35- 23
AB03 2059	Driven Pulley	29- 14
AB03 3064	Drive Pulley	67- 16
AB03 3069	Timing Pulley - 22Z/24Z	35- 3
AB04 0015	Spring Clutch - Tray Bottom Plate	55- 12
AC01 2060	Exposure Glass - A3T-3.2	9- 23
AC03 0103	1st Mirror	31- 13
AC03 0106	4/5 Mirror	33- 16
AC03 0107	6th Mirror	35- 20
AC03 5022	Rear Mirror Clamp - 1st Mirror	31- 2
AC04 2113	Left Original Scale - A4	9- 20
AC04 2117	Left Original Scale - LT	9- 20
AC04 2120	Rear Original Scale (A4)	9- 21
AC04 2124	Rear Original Scale - LT	9- 21
AD02 5019	Drum Pick-off Pawl	43- 2
AD02 7004	Charge Roller	41- 13
AD04 3035	Toner Collection Coil	43- 30
AE01 1024	Hot Roller	47- 22
AE02 0050	Pressure Roller	49- 15
AE03 0022	Bearing - 12x24x64m	49- 14
AE03 0023	Bearing - 30x42x7mm	47- 21
AE03 1028	Bushing - 4mm	49- 11
AE04 2030	Cleaning Roller	49- 12
AE04 4019	Hot Roller Stripper	47- 20
AF01 0018	Duplex Tray	57- 27
AF01 3003	Bottom Plate Pad - Duplex	57- 2
AF01 5027	Paper Size Slider	17- 14
AF01 6160	Rear Side Fence	57- 3
AF01 6161	Front Side Fence	57- 4
AF02 0316	Lower Registration Roller	27- 13
AF02 0317	Stack Roller	53- 15
AF02 0319	Transport Roller	53- 6
AF02 0320	Right Transport Roller	53- 7

Part No.	Description	Page and Index No.
AF02 0327	Exit Roller	59- 20
AF02 0327	Exit Roller	61- 13
AF02 0330	Vertical Driven Roller	19- 36
AF02 0336	Inverter Drive Roller	59- 22
AF02 0337	Upper Relay Roller	27- 20
AF02 0338	Lower Relay Roller	27- 21
AF02 1052	Upper Registration Roller	27- 12
AF02 2042	Middle Pressure Roller	61- 10
AF02 2042	Middle Pressure Roller	59- 14
AF02 2077	Driven Roller	53- 19
AF02 2077	Driven Roller	51- 7
AF02 2079	Vertical Driven Roller	15- 20
AF02 5024	Pick-off Pawl	59- 21
AF03 0024	Pick-up Roller	23- 10
AF03 1024	Feed Roller	53- 17
AF03 1025	Feed Roller	23- 7
AF03 2025	Separation Roller	23- 21
AF04 0031	Upper Exit Roller	59- 19
AF04 0031	Upper Exit Roller	51- 11
AF04 0548	Exit Driven Roller	49- 3
AF04 3076	Copy Tray Slide	9- 14
AF04 3077	Copy Tray Guide	9- 15
AF04 3083	Copy Tray	9- 13
AG05 0074	Registration Knob	9- 6
AG05 0074	Registration Knob	27- 2
AG05 0076	Fusing Knob	49- 13
AG07 0004	Magnetic Catch	75- 18
AG07 0004	Magnetic Catch	9- 4
AG07 0004	Magnetic Catch	59- 3
AG07 0004	Magnetic Catch	15- 19
AG07 0004	Magnetic Catch	21- 16
AG07 0009	Magnetic Catch	49- 4
AH01 0007	Rubber Foot	77- 13
AW01 0040	Original Sensor	33- 11

Part No.	Description	Page and Index No
AW01 0068	Original Length Sensor	29- 5
AW02 0022	Photointerruptor	33- 13
AW02 0022	Photointerruptor	73- 8
AW02 0068	Photointerruptor	27- 15
AW02 0069	Photointerruptor	19- 28
AW02 0069	Photointerruptor	15- 15
AW02 0075	Photointerrupter	23- 16
AW02 0075	Photointerrupter	57- 18
AW02 0075	Photointerrupter	55- 21
AW02 0075	Photointerrupter	61- 6
AW02 0075	Photointerrupter	21- 7
AW02 0086	Photointerruptor	29- 13
AW02 0086	Photointerruptor	25- 12
AW02 0086	Photointerruptor	59- 10
AW02 0086	Photointerrupter	65- 27
AW03 0054	Optical Fiber - 250mm	71- 9
AW03 0055	Optical Fiber - 420mm	71- 8
AW03 0056	Optical Fiber - 550mm	73- 9
AW10 0027	Thermister	31- 12
AW10 0027	Thermister	9- 29
AW10 0032	Thermister - 25°C 10k Ω	41- 24
AW23 0008	ID Sensor	39- 18
AW23 0009	Toner End Sensor	39- 22
AW50 0010	Push Switch	73- 5
AW50 0012	Push Switch	23- 17
AX05 0090	Motor - DC 24V 36W	21- 8
AX06 0108	Motor - Dc24v 45w	63- 8
AX12 0039	DC SOL 24V 400GF	59- 25
AX20 0101	Magnetic Clutch - 2.5kgf 35Z	23- 12
AX20 0105	Magnetic Clutch - 15kgf 24Z	65- 6
AX20 0106	Magnetic Clutch - 15kgf 52Z	65- 9
AX20 0107	Magnetic Clutch - 10kgf 25Z	67- 25
AX20 0109	Magnetic Clutch - 10kgf.cm 35Z	67- 27
AX21 0058	Magnetic Clutch - 42z	67- 24

Part No.	Description	Page and Index No.
AX21 0059	Spring Clutch	65- 30
AX31 0024	Total Counter	69- 9
AX40 0021	Tray Anticondensation Heater - 115V 18W	69- 6
AX40 0022	Tray Anticondensation Heater - 240V 18W	69- 6
AX40 0047	Anticondensation Heater - 115V 15W	33- 22
AX40 0048	Anticondensation Heater - 240V 15W	33- 22
AX40 0094	Anticondensation Heater - 120V 9W	75- 1
AX40 0095	Anticondensation Heater - 230V 9W	75- 1
AX43 0023	Fusing Lamp - 120V 350W	47- 24
AX43 0025	Fusing Lamp - 230V 350W	47- 24
AX43 0030	Main Fusing Lamp - 120V 550W	47- 25
AX43 0031	Main Fusing Lamp - 230V 550W	47- 25
AX52 0026	Exposure Lamp - 85V 200W (EU/ASIA/TWN)	31- 7
AX52 0028	Exposure Lamp - 97V 200W (NA)	31- 7
AX64 0058	Fan Motor - DC 24V 4.32W	73- 6
AX64 0059	Fan Motor - DC24V 3.12W	61- 3
AX64 0059	Fan Motor - DC24V 3.12W	59- 7
AZ02 0008	Coil - 1 0mh 2A	73- 21
AZ13 0023	Transformer - 230V	71- 18
AZ23 0055	DC Drive Board - 100/120V (NA)	71- 10
AZ23 0060	DC Drive Board - 220V/240V (EU/ASIA/TWN)	71- 10
AZ30 0041	Power Pack - Transfer Unit	45- 26
AZ32 0078	DC Power Pack	73- 2
AZ43 0020	High Voltage Supply Coard	73- 3
AZ43 0020	High Voltage Supply Coard	65- 25
AZ48 0021	Relay Harness - 3P	29- 28
AZ48 0029	CT Harness	41- 1
C105 2352	Stepped Screw - M6x1.7	63- 12
C225 2866	Decal - Key Top Cover	83- 11
C225 2867	Decal - Cover - Panel - Nashua	83- 11
C225 5866	Decal - Key Top Cover	9- 34
C225 5867	Decal - Cover - Panel - Nashua	9- 34
G011 3305	Gear - 16T	15- 9
G011 3305	Gear - 16T	57- 8

Part No.	Description	Page and Index No
G012 3897	Relay Harness - Toner End Sensor	39- 20
G020 2554	Paper Feed Roller Ass’y (NA)	25- 10
G020 2555	Paper Feed Roller	25- 8
G020 2565	Paper Guide	25- 7
G020 2570	Shaft - Paper Feed Roller (NA)	25- 6
G020 2585	Front Pin - Paper Feed Roller	25- 5
G020 2586	Rear Pin - Paper Feed Roller	25- 9
G020 2645	Friction Pad	17- 13

Part No.	Description	Page and Index No.
A008 9502	Silicone Grease - G40M.	85- 6
A028 9300	Grease Nok Barrierta - JFE 5 5/2	85- 3
A053 1957	Flex Hinge - Platen Cover	11- 5
A069 1883	Shoe - Scanner	33- 6
A069 1883	Shoe - Scanner	29- 17
A069 1883	Shoe - Scanner	31- 3
A069 5168	Heat Sink - Motor Board	81- 1
A075 1766	Adjusting Cam	35- 22
A077 1310	Snap Ring - M2	41- 6
A077 1673	Thermofuse Terminal	31- 5
A077 1690	Spring Plate - Mirror	33- 4
A077 1690	Spring Plate - Mirror	35- 19
A077 4162	Shoulder Screw - M3	49- 16
A079 3626	Stepped Screw - Swing Cleaning	55- 7
A085 1670	Exposure Adjusting Plate	31- 8
A085 1861	Main Refretor	31- 18
A096 1692	ADS Case	33- 15
A096 1692	ADS Case (Option)	33- 31
A096 1693	ADS Cover	33- 14
A096 1693	ADS Cover (Option)	33- 32
A096 1873	Scanner Shoe Pin	31- 17
A096 1873	Scanner Shoe Pin	33- 1
A096 3863	Spacer - 4x6x1	17- 26
A096 5230	ADS Board (Option)	33- 27
A111 1753	Seal - 0.1x18x49	29- 7
A134 1071	Left Grip Plate	69- 14
A134 1071	Left Grip Plate	63- 23
A134 1072	Right Bracket - Grip Plate	69- 15
A134 1072	Right Bracket - Grip Plate	63- 22
A134 1073	Left Bracket - Grip Plate	69- 16
A134 1073	Left Bracket - Grip Plate	63- 24
A134 1121	Joint Gear	63- 16
A134 1394	Front Platen Cover	11- 4
A134 1395	Rear Platen Cover	11- 7

Part No.	Description	Page and Index No
A134 1396	Original Holder	11- 8
A134 2557	Regist Sensor Bracket	27- 14
A134 2656	Stopper Plate	23- 6
A134 2658	Grounding Plate	23- 5
A134 2662	Grounding Plate	23- 18
A134 2667	Separation Drive Shaft	23- 29
A134 2668	Separation Driven Shaft	23- 23
A134 2674	Torque Limitter - 400fg	23- 22
A134 2676	Solenoid Bracket (A212)	67- 5
A134 2678	Solenoid Link (A212)	67- 3
A134 2679	Pick-up Lever	67- 2
A134 2680	DC Solenoid	67- 6
A134 2688	Positioning Plate	23- 1
A134 2701	By-pass Feed Guide	15- 4
A134 2927	Tray Lock Bracket	77- 20
A134 2941	Tray Sensor Bracket	73- 4
A134 2947	Heater Cover (Option)	69- 10
A134 2956	Paper Feed Front Cover	51- 1
A134 3161	Bottle Drive Bracket	37- 26
A134 3162	Bottle Drive Motor	37- 23
A134 3180	Bottle Chuck	37- 3
A134 3181	Chuck Roller	37- 6
A134 3201	Cam - Toner Bottle	37- 32
A134 3215	Ruber Cap	37- 9
A134 4061	Rear Terminal Plate	47- 11
A134 4153	Slide Rail - Fusing	49- 10
A134 4161	Pressure Lever	49- 18
A134 4280	Fusing Exit Guide - Lower	49- 2
A134 4351	Stay - Fusing Rail	77- 5
A134 4355	Fusing Unit Stopper	77- 7
A134 4508	Inverter Guide Plate	55- 13
A134 4512	Feed Roller Shaft	53- 21
A134 4525	End Fence	57- 26
A134 4527	Separation Roller	55- 20

Part No.	Description	Page and Index No.
A134 4619	Guide Plate Link	51- 12
A134 4620	Grounding Plate	57- 19
A134 4649	Paper Guide Holder	53- 16
A134 4658	Vibrating Plate	55- 23
A134 4662	Duplex Guide Plate	55- 24
A134 4676	Paper End Feeler	53- 8
A134 4688	Front Side Fence Rack	57- 10
A134 4689	Rear Side Fence Rack	57- 9
A134 4690	Clutch Stopper	53- 20
A134 4701	Front Upper Cover	51- 3
A134 4710	End Fence Actuator	57- 24
A134 4712	Right Cover Bracket	51- 4
A134 4714	Tightener	57- 15
A134 4720	End Fence Upper Cover	51- 2
A134 4721	Connector Cover	51- 6
A134 4726	Guide Plate Knob	51- 19
A134 4728	Inverter Feeler	51- 5
A134 4730	Entrance Feeler	51- 14
A134 4739	Lower Guide Plate Knob	51- 9
A134 4740	Lower Guide Plate	51- 15
A134 4751	Front Side Plate	53- 1
A134 4765	Grounding Plate	55- 22
A134 4781	Rear Side Plate	53- 9
A134 4790	Paper End Sensor	55- 18
A134 4799	Motor Bracket	55- 1
A134 4800	Motor Bracket	55- 2
A134 4804	Guide Plate Stopper	55- 19
A134 4808	Rear Guide Holder	53- 18
A134 4809	Front Guide Holder	53- 14
A134 4884	Decal - Duplex Misfeed Removal	83- 18
A134 4884	Decal - Duplex Misfeed Removal	51- 21
A134 4901	Right Slide Rail Ass’y	77- 18
A134 5254	Duplex Control Board	57- 23
A134 5290	Transport Drive Motor	55- 3

Part No.	Description	Page and Index No
A134 5291	Jogger Drive Motor - Side Fence	57- 20
A134 5292	Jogger Drive Motor - End Fence	57- 21
A134 5311	By-pass Feed Harness	23- 14
A134 5320	Toner Bottle Cam	57- 28
A134 5321	Sensor Relay Harness	57- 25
A134 5322	End Fence Harness	57- 31
A134 5323	Motor Harness	57- 22
A153 1107	Motor Bracket	63- 25
A153 1112	Drive Gear Holder	65- 15
A153 1117	Drum Drive Shaft	65- 21
A153 1125	Development Drive Bracket	65- 8
A153 1127	Clutch Shaft	65- 5
A153 1128	Tightener	63- 10
A153 1131	Development Support Plate	63- 7
A153 1132	Development Tightener	65- 16
A153 1135	Drum Drive Tightener	65- 19
A153 1251	Upper Cover	9- 24
A153 1259	Platen Cover Bracket - Left	73- 11
A153 1285	Emblem (RIC)	9- 1
A153 1285	Emblem (RIC)	83- 4
A153 1353	Front Cover Hinge	69- 1
A153 1354	Hinge Pin	9- 3
A153 1355	Key Counter Bracket	69- 2
A153 1365	Symbol Explanation Decal	83- 14
A153 1369	Platen Cover Ass’y	11- 1
A153 1370	Platen Cover Hinge	11- 3
A153 1380	Platen Cover Bracket	11- 11
A153 1383	Platen Cover Feeler	11- 9
A153 1452	Key-top Start	13- 2
A153 1453	Key-top Interrupt	13- 3
A153 1454	Key-top Mode Clear	13- 4
A153 1455	Key-top Program	13- 5
A153 1456	Key-top 10 Key	13- 6
A153 1457	Key-top Cler/Stop	13- 7

Part No.	Description	Page and Index No.
A153 1458	Key-top Auto Density	13- 8
A153 1459	Key-top Derker	13- 9
A153 1460	Key-top Lighter	13- 10
A153 1461	Key-top Auto Paper Select	13- 11
A153 1462	Key-top Paper Select	13- 12
A153 1463	Key-top Full Size	13- 13
A153 1464	Key-top Auto Reduce/Enlarge	13- 14
A153 1465	Key-top - Sorter	13- 18
A153 1469	Panel Cover	9- 11
A153 1469	Panel Cover	13- 15
A153 1475	Decal - 10key Zoom -LT/DLT	83- 7
A153 1476	Decal - Margin Adjustment - LT/DLT	83- 8
A153 1478	Decal - 10key Zoom - A4/A3	83- 7
A153 1479	Decal - Margin Adjustment - A4/A3	83- 8
A153 1675	Harness Guard Seal	75- 28
A153 1700	Scanner Drive Motor - DC2.3V 13.5W	35- 13
A153 1720	Scanner Rail	33- 12
A153 1721	Spring Plate	33- 10
A153 1749	Scale Bracket	31- 11
A153 1754	Exposure Stay	31- 14
A153 1757	Contact Grass Holder	31- 16
A153 1776	Front Mirror Clamp - 1st Mirror	31- 4
A153 1777	Front Terminal	31- 6
A153 1778	Rear Terminal	31- 9
A153 1779	Thermostat - 121°C 250V 10A	31- 15
A153 1780	Exposure Lamp Harness	31- 10
A153 1801	2nd Scanner Ass’y	33- 8
A153 1805	Front Mirror Holder	33- 5
A153 1806	Rear Mirror Holder	33- 7
A153 1808	2nd Mirror	33- 3
A153 1809	3rd Mirror	33- 9
A153 1851	Lens Cover	29- 3
A153 1854	Wire Guide	29- 27
A153 1855	Shading Plate	29- 26

Part No.	Description	Page and Index No
A153 1859	Shielding Sheet Guide	29- 23
A153 1861	Bracket - Flexible Board	29- 25
A153 1905	3rd Scanner Filler	33- 30
A153 1906	Adjust Shoe	33- 20
A153 1908	Shielding Plate	33- 17
A153 1912	3rd Scanner Stay	33- 26
A153 1923	6th Mirror Bracket	35- 27
A153 1924	6th Mirror Plate	35- 28
A153 1935	Lens Drive Bracket	35- 29
A153 1947	Magnification Drive Unit Barcket	35- 24
A153 1952	Magnification Rail	35- 21
A153 1961	Lens Cover	29- 6
A153 1971	Original Sensor Bracket	29- 8
A153 1974	Original Sensor Bracket	29- 24
A153 1976	ADS Sensor Bracket	33- 25
A153 1986	Cooling Fan Duct	73- 7
A153 2052	Release Bracket	75- 23
A153 2061	Release Lever	75- 29
A153 2072	Release Link Lever	75- 5
A153 2073	Guide Rail	75- 9
A153 2075	Front Roller Cam	75- 11
A153 2076	Rear Roller Cam	75- 12
A153 2080	Eraser Lamp	75- 17
A153 2083	Left Drum Rail	75- 16
A153 2084	Spacer	75- 10
A153 2085	Spacer	75- 27
A153 2090	Quenching Lamp	75- 14
A153 2116	Grounding Plate	41- 7
A153 2126	Swing Arm	41- 3
A153 2130	Receptacle Housing	65- 13
A153 2135	Charge Roller Terminal Ass’y	41- 8
A153 2143	Shielding Plate	41- 14
A153 2277	Cleaning Blade	43- 39
A153 2301	Front Stay	43- 36

Part No.	Description	Page and Index No.
A153 2302	Drum Bearing Holder	43- 38
A153 2303	Grounding Plate	43- 35
A153 2995	Decal Paper Size - LT/DLT	83- 1
A153 2995	Decal Paper Size - LT/DLT	17- 35
A153 2996	Decal Paper Size - A4/A3	17- 35
A153 2996	Decal Paper Size - A4/A3	83- 1
A153 3065	Right Paddle Roller	39- 16
A153 3075	Entrance Seal	39- 2
A153 3086	Bias Terminal	65- 12
A153 3114	Transfer Entrance Guide	27- 10
A153 3149	Knob Screw - M4x12	39- 27
A153 3262	Bottle Unit Hinge	37- 29
A153 3264	Bottle Unit Upper Hinge	37- 33
A153 3265	Bottle Unit Lock Plate	37- 21
A153 3266	Bottle Unit Link Plate	37- 30
A153 3555	Cleaning Entrance Seal	43- 24
A153 3558	Blade Seal	43- 14
A153 3561	Cleaning Blade Bracket	43- 9
A153 3570	Spring Plate	43- 15
A153 3591	Mylar - 17x335	43- 29
A153 3598	Pin Bracket	75- 22
A153 3865	Belt Drive Roller	45- 13
A153 3866	Belt Drive Roller	45- 3
A153 3870	Transfer Bias Roller	45- 8
A153 3873	Bias Roller Terminal	45- 5
A153 3874	Earth Terminal	45- 12
A153 3877	Spring Plate	45- 25
A153 3888	Earth Plate	45- 24
A153 3892	Belt Cleaning Blade	45- 17
A153 3893	Belt Cleaning Stay	45- 18
A153 3897	Harness Clamp	45- 28
A153 3920	Belt Release Arm	75- 25
A153 3929	Decal - Caution Lever	77- 16
A153 3929	Decal - Caution Lever	83- 24

Part No.	Description	Page and Index No
A153 3931	Transport Unit Stay	77- 10
A153 3933	Stopper Stay	77- 9
A153 4055	Upper Fusing Guide	47- 26
A153 4062	Electrode Plate - Middle	47- 12
A153 4063	Front Terminal Plate	47- 14
A153 4074	Terminal Connector - 2p	47- 4
A153 4075	Front Holder	47- 15
A153 4088	Thermister	47- 9
A153 4089	Thermister - 2	47- 8
A153 4102	Front Lamp Terminal Holder	47- 16
A153 4112	Stripper Bracket	47- 19
A153 4114	Stripper Stopper	47- 17
A153 4197	Lower Fusing Guide	49- 9
A153 5114	RAM Board	71- 15
A153 5114	Ram Board	81- 2
A153 5141	Lens Drive Harness	29- 16
A153 5211	Mirror Drive Motor - DC24V 8.6V	35- 25
A153 5212	Lens Drive Motor - Horizontal	29- 18
A153 5213	Lens Drive Motor - DC24V 8.6W	35- 5
A153 5266	Thermofuse - 169°c	47- 13
A153 5328	CT Harness	59- 9
A153 5328	CT Harness	61- 5
A153 5330	CT Harness - 7p	39- 19
A153 5339	Density Sensor Harness	75- 20
A153 5340	CT Harness	65- 10
A153 5344	Power Supply Harness - 2trays (A212)(NA)	71- 7
A153 5391	Optical Harness - 1	29- 9
A153 5392	Optical Harness - 2	29- 10
A153 5395	Optical Harness - 5	29- 15
A153 5545	AC Drive Board - 120V (NA)	71- 11
A153 5571	Power Supply Cord - 120V (NA)	73- 13
A153 5601	AC Relay Harness	73- 19
A153 5621	Noise Filter Board	73- 20
A153 5644	Power Supply Harness - 2trays (A212)	71- 7

Part No.	Description	Page and Index No.
A153 5645	AC Drive Board (230V)(EU/AISA/TWN)	71- 11
A153 5671	Power Supply Cord (EU/ASIA/TWN)	73- 13
A153 5801	DC Drive Board Bracket	71- 12
A153 5802	Lower Bracket - DC Drive Board	63- 1
A153 5803	Upper Bracket - DC Drive Board	71- 6
A153 5803	Upper Bracket - DC Drive Board	35- 10
A153 5806	Bracket Paper Tray Unit	71- 19
A153 5808	Bracket - Safety Switch	69- 13
A153 5809	Arm Interlock SW	69- 12
A153 5812	Left Lower Bracket	67- 26
A153 5813	Main Control Board Bracket	67- 1
A153 6409	Decal - Keytop Cover	9- 34
A153 6409	Decal - Keytop Cover	83- 11
A153 6423	Support Cover (INF)	9- 1
A153 6423	Support Cover (INF)	83- 4
A153 9001	Scanner Adjustment Tool	85- 7
A153 9004	Wiping Cloth	85- 8
A153 9510	OPC Drum	41- 26
A153 9513	Harness - ADS (Option)	33- 24
A154 4616	Paper Holder	51- 17
A154 4620	Bottom Plate	57- 1
A154 4621	Front Guide Plate	57- 30
A154 4622	Rear Guide Plate	57- 29
A154 5325	Duplex Unit Relay Harness	73- 15
A155 2667	Lift Sensor Feeler (A214)	23- 24
A155 2675	Pick-up Bracket (A214)	67- 5
A155 2677	Pick-up Link (A214)	67- 3
A155 2682	Lift Sensor Bracket (A214)	23- 32
A155 5165	LCT Main Board	21- 18
A155 5170	Push Switch	21- 27
A155 5314	LCT Relay Harness	71- 23
A155 5342	LCT Harness	21- 31
A155 5345	CT Harness (A214)	23- 33
A155 5348	Paper End Sensor Harness	21- 4

Part No.	Description	Page and Index No
A155 5349	LCT Vertical Harness	19- 33
A155 6101	LCT Upper Cover	19- 6
A155 6110	Front Side Plate	21- 29
A155 6112	Spacer - LCT	19- 38
A155 6113	Decal - Paper Set	19- 2
A155 6113	Decal - Paper Set	83- 3
A155 6114	Caution Decal - LCT	19- 35
A155 6114	Caution Decal - LCT	83- 19
A155 6116	Safety Switch Bracket	21- 21
A155 6117	Safety Switch Lever	21- 23
A155 6118	Spring Plate	21- 20
A155 6125	Rear Side Bracket	21- 28
A155 6136	Lift Sensor Bracket	21- 11
A155 6141	Tray Bottom Plate	21- 17
A155 6142	LCT Paper Tray	19- 14
A155 6143	Left Bracket	21- 1
A155 6145	Tray Cover	21- 19
A155 6147	Paper End Sensor Bracket	21- 3
A155 6148	Paper End Sensor Feeler	21- 2
A155 6153	Upper Hinge	21- 6
A155 6162	Cushion	19- 34
A155 6169	Hinge Holder	19- 30
A155 6170	Hinge Bracket	19- 21
A155 6171	Grip Bracket	19- 19
A155 6181	Knob	19- 18
A155 6191	LCT Front Cover	19- 17
A155 6201	LCT Hinge Bracket	19- 8
A155 6203	Paper Tray Stay	21- 5
A155 6207	Cover Bracket	19- 3
A155 6215	Harness Guide	21- 30
A155 6221	LCT Rear Cover	19- 15
A155 6231	LCT Right Cover	19- 16
A155 6241	LCT Harness Cover	19- 26
A155 6251	Upper Stay	19- 9

Part No.	Description	Page and Index No.
A155 6270	Cushion 20x30	19- 39
A155 6302	Hinge Angle	19- 5
A155 6303	Fix Hinge	19- 4
A155 6306	Front Side Fence	19- 22
A155 6307	Rear Side Fence	19- 12
A155 6311	Front Paper Holder	19- 23
A155 6312	Rear Paper Holder	19- 10
A155 6313	Support Guide	19- 11
A155 6321	Front Spring Plate	19- 24
A155 6322	Rear Sprig Plate	19- 25
A155 6324	End Fence	19- 1
A156 1452	Key-top Start (SVN)	13- 2
A156 1453	Key-top Interrupt (SVN)	13- 3
A156 1454	Key-top Mode Clear (SVN)	13- 4
A156 1455	Key-top Program (SVN)	13- 5
A156 1456	Key-top 10 Key (SVN)	13- 6
A156 1457	Key-top Cler/Stop (SVN)	13- 7
A156 1458	Key-top Auto Densty (SVN)	13- 8
A156 1459	Key-top Derker (SVN)	13- 9
A156 1460	Key-top Lighter (SVN)	13- 10
A156 1461	Key-top Auto Paper Select (SVN)	13- 11
A156 1462	Key-top Paper Select (SVN)	13- 12
A156 1463	Key-top Full Size (SVN)	13- 13
A156 1464	Key-top Auto Reduce/Enlarge (SVN)	13- 14
A156 1495	Decal Copy Ratio	83- 9
A156 6413	Emblem (SVN)	83- 4
A156 6413	Emblem (SVN)	9- 1
A157 1084	Moter Stay	61- 1
A157 1084	Morter Stay	59- 2
A157 1111	Belt Tightener	65- 23
A157 1311	Left Innner Cover	9- 17
A157 1321	Left Inner Cover - Small	9- 18
A157 1339	Lower Inner Cover	9- 8
A157 1351	Upper Inner Cover	9- 9

Part No.	Description	Page and Index No
A157 1360	Operation Sheet (A212)	83- 22
A157 1360	Operation Sheet (A212)	9- 5
A157 1770	1st Scanner Ass'y (EU/ASIA/TWN)	31- 1
A157 1790	1st Scanner Ass'y (NA)	31- 1
A157 2557	Spring Plate	15- 21
A157 2560	Paper Feed Support Plate	67- 12
A157 2800	Paper End Sensor Bracket	25- 11
A157 2804	Shield Plate - Paper End Sensor	25- 15
A157 3861	Transfer Belt	45- 2
A157 3900	Support Plate	77- 14
A157 3900	Support Plate	45- 32
A157 4456	Spring Plate	59- 13
A157 4456	Spring Plate	61- 9
A157 4459	Paper Exit Feeler	61- 7
A157 4459	Paper Exit Feeler	59- 11
A157 5311	Rear Lower Harness - 2tray (A212)	71- 17
A157 5336	Vertical Transport Harness	15- 18
A157 6403	Front Cover (NRG)	9- 2
A158 1360	Operation Sheet (A214)	83- 22
A158 1360	Operation Sheet (A214)	9- 5
A158 4451	Reverse Guide Plate	59- 5
A158 4452	Lower Reverse Guide Plate	59- 4
A158 4453	Exit Cover	59- 17
A158 4459	Spring Plate	59- 18
A158 4463	Pick-off Pawl Arm	59- 24
A158 4466	Switch Bracket	63- 21
A158 4467	Solenoid Bracket	59- 26
A158 4603	Paper Holder	51- 18
A158 4604	Duplex Lower Guide	51- 22
A158 4607	Upper Guide Plate	51- 10
A158 5310	Duplex Paper Feed Harness (A214)	71- 14
A158 5343	Duplex Power Supply Harness (A214)(NA)	71- 7
A160 5643	Duplex Power Supply Harness (A214)	71- 7
A204 1471	Keytop - Halftone	13- 19

Part No.	Description	Page and Index No.
A204 1472	Keytop - Enlarge	13- 20
A204 1473	Keytop - Reduce	13- 21
A204 1677	Optical Filter	75- 21
A204 2101	P.T.L. Lamp Ass‘y	27- 9
A204 2120	Drum Charge Roller Cleaner	41- 25
A204 2155	Decal - Caution	83- 15
A204 2187	Spacer-11mm	75- 6
A204 2188	Spacer-15mm	75- 7
A204 3080	Development Filter	39- 28
A204 3568	Rear Bushing	43- 5
A204 3911	Cam Shaft	65- 31
A204 3915	Magnet Clutch Bracket	65- 26
A204 3921	Clutch Arm	65- 34
A204 3922	Brake Cam	65- 33
A204 4651	Bottom Pressure Plate	57- 5
A204 5117	IC - RF5A230	81- 3
A204 5300	Fusing Unit Connector - 115V	47- 5
A204 5326	Fusing Relay Harness	71- 21
A204 5665	Fusing Unit Connector - 230V	47- 5
A207 1471	Keytop - Halftone (SVN)	13- 19
A207 1472	Keytop - Enlarge (SVN)	13- 20
A207 1473	Keytop - Reduce (SVN)	13- 21
A208 4084	Fusing Connector Bracket	47- 6
A208 4102	Rear Lamp Terminal Holder	47- 7
A208 4355	Grounding Brush - Fusing Entrance	77- 6
A212 1073	Stopper Bracket	25- 2
A212 1087	Middle Upper Stay	25- 17
A212 1088	Middle Lower Stay	77- 19
A212 1099	Stopper	25- 1
A212 1111	Spring Cover	65- 18
A212 1151	Tension Spring	63- 19
A212 1151	Tension Spring	65- 17
A212 1258	Right Bracket - Platen Ccover	73- 10
A212 1261	Front Right Cover	9- 28

Part No.	Description	Page and Index No
A212 1271	Rear Right Cover (A212)	9- 27
A212 1282	Front Cover (A212)(RIC)	9- 2
A212 1291	Rear Cover	9- 25
A212 1302	Left Cover	9- 16
A212 1323	Operation Panel Ass’y - LT (A212)	9- 12
A212 1323	Operation Panel Ass’y - LT (A212)	13- *
A212 1324	Operation Panel Ass’y - A4 (A212)	9- 12
A212 1324	Operation Panel Ass’y - A4 (A212)	13- *
A212 1328	Operation Panel Ass’y (A212)(SVN)	9- 12
A212 1328	Operation Panel Ass‘y - LT (A212)(SVN)	13- *
A212 1350	Right Middle Cover	75- 24
A212 1352	Inner Cover - Right Lower	9- 7
A212 1465	Key-top - Sorter (SVN)	13- 18
A212 1481	Operation Panel Case - A4	13- 22
A212 1482	Display Panel - A4 (A212)	13- 24
A212 1483	Sorter Sheet - A4 (A212)	13- 16
A212 1485	Operation Sheet (A4)	83- 10
A212 1485	Operation panel Sheet - A4	9- 31
A212 1487	Sorter Sheet (A212)(SVN)	13- 16
A212 1491	Operation Panel Case - LT	13- 22
A212 1492	Display Panel - LT (A212)	13- 24
A212 1493	Sheet Sorter - LT (A212)	13- 16
A212 1494	Operation Panel Sheet	13- 23
A212 1495	Operation Sheet (LT)	83- 10
A212 1495	Operation Panes Sheet - LT	13- 17
A212 1674	Shield Glass Guide	75- 19
A212 1695	Tension Spring	35- 12
A212 1707	Tension Bracket - Long	35- 14
A212 1708	Tension Bracket - Short	35- 6
A212 1710	Timing Pulley - 44Z	35- 16
A212 1807	Harness Guide	33- 2
A212 1840	Lens Magnification Unit	29- 1
A212 1841	Lens Drive Unit	29- 11
A212 1903	3rd Scanner Bracket	33- 28

Part No.	Description	Page and Index No.
A212 1914	3rd Scanner Rack	33- 19
A212 1981	Scaner Home Sensor Bracket	33- 29
A212 2060	Wire Pulley	75- 13
A212 2071	Cam Lever	75- 15
A212 2101	Release Spring	75- 3
A212 2102	Pressure Spring	75- 2
A212 2110	Charge Roller Ass'y	41- 2
A212 2131	Idle Gear 14z	41- 16
A212 2132	Idle Gear 20z	41- 17
A212 2142	Cam Lever	65- 32
A212 2251	Pressure Blade Spring	43- 8
A212 2252	Pressure Roller Spring	41- 10
A212 2255	Drum Unit	43- 1
A212 2351	Rear Roller Bushing	41- 5
A212 2352	Rear Roller Housing	41- 11
A212 2353	Gront Roller Bushint	41- 18
A212 2354	Pad Pressure Spring	43- 11
A212 2524	Spring	25- 13
A212 2531	Timing Belt - S3M 300	67- 8
A212 2533	Paper Tray Ass'y (LT)	17- *
A212 2534	Paper Size Sensor Board	15- 7
A212 2537	Bushing	27- 7
A212 2538	Bushing	27- 17
A212 2539	Spring - Registration Roller	27- 5
A212 2542	Bottom Plate Ass'y	17- 12
A212 2547	Rear Side Fence Ass'y	17- 17
A212 2550	Vertical Guide Plate	27- 18
A212 2551	Lower Guide Plate	27- 8
A212 2552	Vertical Relay Guide Plate	27- 6
A212 2558	Upper Resistration Guide	27- 19
A212 2559	Switch Bracket	19- 29
A212 2559	Switch Bracket	15- 17
A212 2562	Solenoid Bracket	67- 23
A212 2563	Lower Registration Guide	27- 3

Part No.	Description	Page and Index No
A212 2564	Tightener	67- 11
A212 2567	Rear Side Fence	17- 18
A212 2570	Paper Feed Roller Ass'y (EU/ASIA/TWN)	25- 10
A212 2571	Vertical Transport Guide (A212)	15- 22
A212 2575	Shaft - Paper Feed Roller (EU/ASIA/TWN)	25- 6
A212 2580	Vertical Transfer Hinge (A212)	27- 11
A212 2581	Front Side Fence Ass'y	17- 3
A212 2582	Front Corner Separator	17- 8
A212 2583	Rear Corner Separator	17- 21
A212 2584	Paper Feed Drive Shaft	67- 21
A212 2586	Hinge Bracket (A212)	15- 14
A212 2587	Feed Roller Bushing - Front	25- 3
A212 2590	Paper Tray	17- 32
A212 2591	Vertical Transfer (A212)	15- 16
A212 2652	Middle Guide Rail	77- 15
A212 2658	Pick-up Arm	23- 30
A212 2659	By-pass Feed Housing	23- 15
A212 2660	Paper End Feeler	23- 2
A212 2661	Adjusting Plate - Front	17- 4
A212 2663	Separation Guide	23- 20
A212 2670	Rear Guide Plate	23- 19
A212 2671	By-pass Feed Cover	23- 4
A212 2672	Pressure Spring	67- 7
A212 2673	Release Spring	67- 4
A212 2692	By-pass Feed Table Ass'y	15- 1
A212 2697	By-pass Feed Table	15- 5
A212 2705	Magnet Catch Plate	15- 6
A212 2706	Rear Fence Rack	15- 8
A212 2707	Front Fence Rack	15- 10
A212 2711	Front Side Fence	15- 2
A212 2716	Rear Side Fence	15- 3
A212 2746	By-pass Feed Cover	15- 11
A212 2757	Paper Tray Ass'y (A4)	17- *
A212 2758	Decal - Paper Setting	83- 17

Part No.	Description	Page and Index No.
A212 2758	Decal - Paper Set Diection	17- 2
A212 2765	Spring Plate - Gear Side Fence	17- 16
A212 2769	Rear Stopper Spring	17- 6
A212 2802	Feeler Paper End Sensor	25- 4
A212 2805	Tray Bottom Plate Sheet	17- 33
A212 2805	Tray Bottom Plate Sheet	83- 21
A212 2822	Left Slide Rail Ass’y	77- 1
A212 2823	Right Slide Rail Ass’y	77- 12
A212 2844	End Fence Ass’y	17- 9
A212 2870	Adjusting Plate Rear	17- 20
A212 2871	Adjusting Plate Front	17- 7
A212 2905	Release Arm - Paper End	25- 14
A212 2929	Right Rail - Feed Tray	77- 17
A212 2956	Paper Feed Front Cover	17- 1
A212 2982	Paper Lift Shutter	17- 31
A212 3051	Development Unit	39- 1
A212 3056	Coupled Gear - 15z/22z	39- 25
A212 3057	Gear - 17Z	39- 24
A212 3058	Gear - 26Z	39- 26
A212 3063	Paddle Roller	39- 14
A212 3068	Toner Bottle Holder	37- 15
A212 3071	Deveropper Rail Seal	69- 18
A212 3072	Relay Adjusting Spring	67- 10
A212 3072	Relay Adjusting Spring	37- 31
A212 3073	Chuck Spring	37- 8
A212 3078	Shutter Spring	37- 17
A212 3079	Toner Collection Coil	39- 10
A212 3081	Decal - Toner Supply	83- 20
A212 3087	Terminal Cap	65- 11
A212 3090	Development Position Plate	39- 4
A212 3150	Toner Supply Unit (RIC-EU)	37- *
A212 3151	Toner Supply Unit (RIC-NA)	37- *
A212 3153	Toner Supply Unit (OEM/RIC-AA)	37- *
A212 3157	Bottole Holder Bracket	37- 27

Part No.	Description	Page and Index No
A212 3172	Shutter	37- 19
A212 3173	Shutter Guide	37- 16
A212 3174	Shutter Holder	37- 18
A212 3177	Toner Slider	37- 4
A212 3179	Chuck Shaft	37- 7
A212 3185	Toner Supply Gear (RIC-EU)	37- 1
A212 3187	Toner Supply Gear (RIC-NA)	37- 1
A212 3189	Toner Supply Gear (OEM/RIC-AA)	37- 1
A212 3190	Toner Bottle Stopper	37- 10
A212 3197	Bottle Holder	37- 13
A212 3200	Toner Hopper Ass’y	39- 21
A212 3270	Stay - Toner Supply	69- 17
A212 3281	Bottle Bracket Cover	37- 14
A212 3580	Toner Collection Unit	41- 23
A212 3590	ADS Plate	43- 19
A212 3595	Pick-off Pawl Retainer	43- 3
A212 3850	Transfer Unit	45- 1
A212 3851	Spring - T/S Unit	45- 20
A212 3851	Spring - T/S Unit	65- 35
A212 3853	Bias Roller Bushing - Rear	45- 11
A212 3862	Transfer Belt Frame	45- 7
A212 3863	Front Side Plate	45- 4
A212 3865	Belt Drive Gear - 25z	45- 10
A212 3876	Rear Side Plate	45- 9
A212 3882	Transfer Belt Casing	45- 31
A212 3883	Toner Collection Cap	45- 29
A212 3884	Belt Guide Plate	45- 14
A212 3886	Belt Pressure Lever	45- 19
A212 3887	Belt Release Stay	45- 21
A212 3888	Earth Plate	45- 30
A212 3894	Bushing	45- 16
A212 3895	Bushing	45- 22
A212 3901	Entrance Guide Plate	45- 27
A212 3914	Magnetic Clutch Feeler	65- 28

Part No.	Description	Page and Index No.
A212 3930	Belt Unit Handle	77- 8
A212 4005	Fusing Unit (NA)	47- *
A212 4006	Fusing Exit Unit	49- 1
A212 4007	Fusing Unit (EU/ASIA/TWN)	47- *
A212 4053	Fusing Upper Stay	47- 2
A212 4103	Solenoid Spring	47- 18
A212 4110	Fuser Stripper Ass'y	47- 27
A212 4130	Fusing Front Cover	47- 1
A212 4151	Fusing Unit Frame	49- 20
A212 4205	Cleaning Roller Bracket	49- 8
A212 4301	Exit Plate	49- 17
A212 4326	Exit Roller Ass'y	49- 6
A212 4352	Fusing Lock Lever	77- 2
A212 4450	Upper Guide Plate	59- 15
A212 4450	Upper Guide Plate	61- 11
A212 4459	Pressure Spring	49- 19
A212 4460	Exit Cover	61- 12
A212 4467	Spring - Stripper Pawl Release	77- 3
A212 4467	Spring - Stripper Pawl Release	69- 8
A212 4495	Shift Clutch	59- 8
A212 4495	Shift Clutch	61- 2
A212 4496	Gear - 24Z	59- 6
A212 4496	Gear - 24Z	61- 14
A212 5101	Main Control Board (NA)	71- 2
A212 5101	Main Control Board (115V)	81- *
A212 5103	IC - 4MX16 - 120NS	71- 4
A212 5132	Density Sensor	43- 18
A212 5160	ADS Board	33- 18
A212 5201	Main Control Board (230V)	81- *
A212 5201	Main Control Board (EU/ASIA/TWN)	71- 2
A212 5312	Optical Harness	71- 13
A212 5316	Paper Feed Harness -2trays (A212)	71- 14
A212 5319	Rear Upper Harness	71- 5
A212 5320	Front Right Harness (EU/ASIA/TWN)	69- 5

Part No.	Description	Page and Index No
A212 5324	Sorter Relay Harness	73- 12
A212 5333	CT Harness	27- 16
A212 5334	CT Harness - 7p	77- 11
A212 5393	Optical Harness 3	33- 23
A212 5460	Operation Panel Board - LT (A212)	13- 1
A212 5465	Operation Panel Board - A4 (A212)	13- 1
A212 5520	Front Right Harness (NA)	69- 5
A212 5661	AC Main Harness	69- 3
A212 5804	Main Switch Bracket (EU/ASIA/TWN)	69- 19
A212 5807	Bracket Ardf	71- 20
A212 5810	Power Supply Cord Bracket	73- 17
A212 5811	Main Control Board Bracket	71- 1
A212 5814	Main Switch Bracket (NA)	69- 19
A212 5820	Total Counter Bracket	69- 11
A212 5829	Decal - Main Switch Cover (EU/ASIA/TWN)	9- 10
A212 5830	Decal - Main Switch (EU/ASIA/TWN)	9- 32
A212 6404	Decal - Model Name - GES (A212)	9- 30
A212 6404	Decal - Model Name - GES (A212)	83- 13
A212 6407	Decal - Model Name - NSA (A212)	9- 30
A212 6407	Decal - Model Name - NST (A212)	83- 13
A212 6407	Decal - Model Name - NST (A214)	83- 13
A212 6412	Front Cover (A212)(SVN)	9- 2
A212 6414	Decal - Model Name - REX (A212)	9- 30
A212 6414	Decal - Model Name - REX (A212)	83- 13
A212 6414	Decal - Model Name - REX (A214)	83- 13
A212 6422	Front Cover (A212)(INF)	9- 2
A212 8607	Operating Instructions - English LT (RIC)	83- 6
A212 8608	Operating Instructions - English A4 (RIC)	83- 6
A212 8650	Operating Instructions - English LT (SVN)	83- 6
A212 8660	Operating Instructions - English A4 (INF)	83- 6
A212 8661	Operating Instructions - German (INF)	83- 6
A212 8662	Operating Instructions - French (INF)	83- 6
A212 8663	Operating Instructions - Italian(INF)	83- 6
A212 8664	Operating Instructions - Spanish(INF)	83- 6

Part No.	Description	Page and Index No.
A212 8690	Operating Instructions - English A4 (NRG)	83- 6
A212 8697	Operating Instructions - English LT (NRG)	83- 6
A212 8834	Operation panel Sheet - LT	9- 31
A214 1277	Front Cover (A214)(RIC)	9- 2
A214 1325	Operation Panel Ass‘y - LT (A214)	13- *
A214 1325	Operation Panel Ass’y - LT (A214)	9- 12
A214 1326	Operation Panel Ass‘y - A4 (A214)	13- *
A214 1326	Operation Panel Ass’y - A4 (A214)	9- 12
A214 1328	Operation Panel Ass‘y - LT (A214)(SVN)	13- *
A214 1328	Operation Panel Ass’y (A214)(SVN)	9- 12
A214 1331	Rear Right Cover (A214)	9- 27
A214 1482	Display Panel - A4 (A214)	13- 24
A214 1483	Paper Exit Sheet - A4 (A214)	13- 16
A214 1485	Operation Panes Sheet - A4	13- 17
A214 1487	Sorter Sheet (A214)(SVN)	13- 16
A214 1492	Display Panel - LT (A214)	13- 24
A214 1493	Paper Exit Sheet - LT (A214)	13- 16
A214 2571	Vertical Transport Guide	19- 27
A214 2878	Mylar - Paper Guide (EU)	15- 24
A214 5309	Rear Lower Harness - Duplex (A214)	71- 17
A214 5460	Operation Panel Board - LT (A214)	13- 1
A214 5465	Operation Panel Board - A4 (A214)	13- 1
A214 6175	LCT Positioning Plate	19- 32
A214 6404	Decal - Model Name - GES (A214)	83- 13
A214 6404	Decal - Model Name - GES (A214)	9- 30
A214 6407	Decal - Model Name - NSA (A214)	9- 30
A214 6412	Front Cover (A214)(SVN)	9- 2
A214 6414	Decal - Model Name - REX (A214)	9- 30
A214 6422	Front Cover (A214)(INF)	9- 2
A214 6460	Lower Hinge	19- 31
A219 2541	Spring	17- 28
A219 2543	Spring	17- 30
A219 2558	End Fence Guide	17- 11
A219 2574	Paper Lift Arm Ass‘y	17- 25

Part No.	Description	Page and Index No
A219 2577	Paper Lift Roller	17- 27
A219 2585	Lever	17- 29
A219 2591	Paper Lift Shaft	17- 24
A219 2597	Bottom Plate Lever	17- 22
A219 2642	Rear Lever Stopper	17- 19
A219 2656	End Fence Spring	17- 10
A219 2664	Front Stopper Lever	17- 5
A219 2692	Decal - Operating	17- 34
A219 2692	Decal - Operation Instructions	83- 23
A300 3155	Stepped Screw - M25x32	21- 22
A334 4706	Disk - Bottom Plate Clutch	55- 11
A335 3251	Top Cover Hinge	19- 7
A335 4351	Guide Roller	21- 10
A335 4352	Timing Belt Clamp	21- 25
A355 1341	Chain Hook	21- 24
A421 2543	Friction Pad	19- 13
A470 1703	Shift Clutch	61- 15
A491 4690	Bottom Plate Hook	57- 7

Part No.	Description	Page and Index No.
5053 0223	Bushing - 8mm	21- 26
5053 0447	Bushing - 6mm	53- 10
5053 0447	Bushing - 6mm	59- 1
5203 1686	Screw - SLID RAIL	77- 4
5203 9501	Grease 501	85- 1
5206 2686	Snap Ring	51- 8
5215 2621	Snap Ring - M6	15- 13
5215 2621	Snap Ring - M6	53- 13
5304 1639	Bushing - 8mm	53- 12
5420 9507	Digital Multimeter - Beckman	85- 2
5420 9516	Test Chart - OS -A3 (10PCS/SET)	85- 5
5442 9103	Launa Oil	85- 4
5443 2668	Bushing - 4x6x7mm	53- 4
5443 2668	Bushing - 4x6x7mm	55- 6
5446 1239	Plate Nut - Key Counter	69- 7
5447 2681	Snap Ring	25- 16
5447 2681	Snap Ring	55- 10
5447 2681	Snap Ring	23- 8
5447 2681	Snap Ring (A212)	15- 23
5447 2768	Stepped Screw - M3	51- 13
5447 2927	Friction Pad - B	15- 12
5447 9078	Heat Resisting Grease MT-78	85- 3
5448 2804	Platen Cover Sheet	11- 2
5474 2152	Bushing - 8x12x12mm	27- 4
5925 2258	Stopper Chain	21- 13

Part No.	Description	Page and Index No
0313 0040B	Philips Pan Head Screw - M3x4	31-107
0313 0040B	Philips Pan Head Screw - M3x4	27-106
0313 0040B	Philips Pan Head Screw - M3x4	59-108
0313 0040B	Philips Pan Head Screw - M3x4	9-104
0313 0040B	Philips Pan Head Screw - M3x4	75-105
0313 0050B	Philips Pan Head Screw - M3X5	47-107
0313 0050B	Philips Pan Head Screw - M3x5	55-102
0313 0060B	Philips Pan Head Screw - M3x6	31-108
0313 0060B	Philips Pan Head Screw - M3x6	41-103
0313 0080B	Philips Pan Head Screw - M3x8	43-106
0313 0140B	Philips Pan Head Screw - M3x14	63-105
0313 0140B	Philips Pan Head Screw - M3x14	15-104
0314 0060B	Philips Pan Head Screw - M4x6	69-106
0314 0060B	Philips Pan Head Screw - M4x6	31-109
0314 0060B	Philips Pan Head Screw - M4x6	43-101
0314 0060B	Philips Pan Head Screw - M4x6	47-104
0314 0060B	Philips Pan Head Screw - M4x6	39-104
0323 0060B	Philips Sunk Screw - M3x6	37-101
0323 0060B	Philips Sunk Screw - M3x6	73-110
0323 0060B	Philips Sunk Screw - M3x6	71-108
0323 0080B	Philips Sunk Screw - M3x8	69-104
0344 0080F	Philips Truss Head Screw - M4x8	51-103
0353 0300B	Bind Screw - M3x30	61-104
0353 0300B	Bind Screw - M3x30	59-105
0413 0050Z	Tapping Screw - M3x5	31-104
0413 0060W	Tapping Screw - M3x6	31-105
0413 0062B	Tapping Screw - M3x6	29-102
0413 0062W	Tapping Screw - M3x6	31-103
0414 0080B	Binding Self-tapping Screw - M4x8	27-107
0414 0080B	Tapping Screw - M4x8	33-104
0414 0080B	Tapping Screw - M4x8	29-107
0414 0080B	Tapping Screw - M4x8	25-102
0414 0080B	Tapping Screw - M4x8	65-106
0414 0080B	Tapping Screw - M4x8	23-103

Part No.	Description	Page and Index No.
0414 0080B	Tapping Screw - M4x8	19-102
0414 0080B	Binding Self-tapping Screw - M4x8	45-106
0414 0082W	Tapping Screw With Flat Washer - M4x8	31-102
0414 0082W	Tapping Screw With Flat Washer - M4x8	15-102
0414 0122B	Philips Tapping Screw - M4x12	49-102
0414 0142B	Binding Self Tapping Screw - M4x14	73-106
0414 0142B	Binding Self Tapping Screw - M4x14	11-101
0433 0050B	Tapping Screw - M3x5	37-102
0433 0060W	Tapping Screw - M3x6	35-110
0434 0060B	Philips Tapping Screw - M4x6	37-108
0434 0060B	Philips Tapping Screw - M4x6	75-101
0434 0060B	Pan Head Self-tapping Screw - M4x6	77-103
0434 0060B	Philips Tapping Screw - M4x6	55-107
0434 0060B	Philips Tapping Screw - M4x6	65-105
0434 0060B	Philips Tapping Screw - M4x6	63-104
0434 0060B	Philips Tapping Screw - M4x6	33-107
0434 0060B	Philips Tapping Screw - M4x6	35-103
0434 0060B	Philips Tapping Screw - M4x6	19-101
0434 0060B	Philips Tapping Screw - M4x6	25-101
0434 0060B	Pan Head Self-tapping Screw - M4x6	67-105
0434 0060B	Philips Tapping Screw - M4x6	69-101
0434 0060B	Philips Tapping Screw - M4x6	21-101
0434 0060B	Philips Tapping Screw - M4x6	59-104
0434 0060B	Philips Tapping Screw - M4x6	61-102
0434 0060B	Philips Tapping Screw - M4x6	27-102
0434 0060B	Philips Tapping Screw - M4x6	71-107
0434 0080B	Philips Tapping Screw - M4x8	59-102
0434 0080B	Pan Head Self-tapping Screw - M4x8	27-108
0434 0082B	Tapping Screw - M4x8	49-103
0434 0082B	Tapping Screw - M4x8	59-103
0434 0082B	Tapping Screw - M4x8	9-101
0434 0352W	Pan Head Self-tapping Screw - M4x35	73-105
0443 0050B	Philips Pan Head Screw - M3x6	27-105
0443 0060B	Hexagon Tapping Screw - M3x6	45-109

Part No.	Description	Page and Index No
0443 0060B	Hexagon Tapping Screw - M3x6	53-101
0443 0060B	Hexagon Tapping Screw - M3x6	55-104
0443 0060B	Hexagon Tapping Screw - M3x6	73-108
0443 0060B	Hexagon Tapping Screw - M3x6	21-103
0443 0060W	Hexagon Head Tapping Screw - M3x6	25-104
0443 0060W	Hexagon Head Tapping Screw - M3x6	51-102
0443 0080B	Tapping Screw - M3x8	45-102
0443 0080B	Tapping Screw - M3x8	73-109
0443 0080W	Hexagon Head Tapping Screw - M3x8	33-102
0452 3010B	Tapping Bind Screw - M3x10	39-107
0453 4006B	Tapping Screw - 4x6	17-103
0573 0040E	Hexagon Headless Set Screw - M3x4	65-102
0573 0040E	Hexagon Headless Set Screw - M3x4	35-101
0573 0100E	Hexagon Headless Set Screw - M3x10	35-111
0574 0050E	Hexagon Headless Set Screw - M4x5	35-105
0622 0100E	Spring Pin - 2x10mm	23-104
0623 0160E	Spring Pin - 3x16mm	21-106
0707 8140B	Bushing - 8x14mm	63-101
0720 0015E	Retaining Ring - 1.5	41-104
0720 0020E	Retaining Ring - M2	41-106
0720 0030E	Retaining Ring - M3	19-106
0720 0030E	Retaining Ring - M3	45-104
0720 0030E	Retaining Ring - M3	17-101
0720 0030E	Retaining Ring - M3	43-105
0720 0030E	Retaining Ring - M3	75-102
0720 0030E	Retaining Ring - M3	55-103
0720 0040E	Retaining Ring - M4	53-103
0720 0040E	Retaining Ring - M4	57-103
0720 0040E	Retaining Ring - M4	59-101
0720 0040E	Retaining Ring - M4	25-103
0720 0040E	Retaining Ring - M4	35-102
0720 0040E	Retaining Ring - M4	75-103
0720 0040E	Retaining Ring - M4	43-107
0720 0040E	Retaining Ring - M4	23-101

Part No.	Description	Page and Index No.
0720 0040E	Retaining Ring - M4	37-106
0720 0040E	Retaining Ring - M4	55-106
0720 0040E	Retaining Ring - M4	49-101
0720 0040E	Retaining Ring - M4	41-102
0720 0040E	Retaining Ring - M4	27-103
0720 0040E	Retaining Ring - M4	29-106
0720 0040E	Retaining Ring - M4	61-103
0720 0040E	Retaining Ring - M4	67-104
0720 0040E	Retaining Ring - M4	39-108
0720 0060	Retaining Ring - M6	65-111
0720 0060E	Retaining Ring - M6	47-103
0720 0060E	Retaining Ring - M6	63-103
0720 0060E	Retaining Ring - M6	65-110
0720 0060E	Retaining Ring - M6	67-103
0720 0060E	Retaining Ring - M6	35-106
0720 0060E	Retaining Ring - M6	21-104
0720 0060E	Retaining Ring - M6	27-104
0725 0100E	Retaining Ring C - M10	37-107
0725 0120E	Retaining Ring C - M12	49-104
0725 0300E	Retaining Ring C - M30	47-106
0727 0090E	Retaining Ring C - M9	39-101
0740 3008	Ball Bearing - 8x22x7	65-101
0740 3008	Ball Bearing - 8x22x7	35-107
0800 0072	Philips Pan Head Screw - M2.6x4	37-105
0801 0137	Philips Pan Head Screw With Spring	71-109
0802 5085	Tapping Screw - M4x8	15-103
0802 5094	Tapping Truss Head Screw - M4x8	9-103
0802 5094	Tapping Truss Head Screw - M4x8	19-103
0802 5221	Tapping Screw - M3x10	65-108
0802 5231	Tapping Screw - M3x6	33-106
0802 5231	Binding Self-tapping Screw - M3x6	39-105
0802 5231	Tapping Screw - M3x6	37-103
0802 5232	Tapping Screw - M3x8	57-102
0802 5232	Binding Self-tapping Screw - M3x8	45-103

Part No.	Description	Page and Index No
0802 5232	Tapping Screw - M3x8	29-103
0802 5233	Tapping Screw - M3x10	37-104
0802 5233	Binding Self-tapping Screw - M3x10	43-102
0802 5233	Tapping Screw - M3x10	41-109
0802 5234	Tapping Screw - M3x12	57-105
0802 5236	Tapping Screw - M4x8	57-104
0802 5236	Tapping Screw - M4x8	65-107
0802 5236	Tapping Screw - M4x8	59-107
0802 5236	Tapping Screw - M4x8	55-105
0802 5236	Tapping Screw - M4x8	61-101
0802 5236	Tapping Screw - M4x8	21-102
0802 5236	Tapping Screw - M4x8	51-101
0802 5237	Tapping Screw - M4x10	29-101
0802 5238	Tapping Screw - M4x12	39-106
0803 0017	Knob Screw - M4x6.5	43-103
0805 3384	Bushing - 5mm	43-108
0805 3415	Ball Bearing - 9x20x6	39-102
0805 3471	Bushing - M8x22x7	41-107
0805 3480	Bushing - 6mm	61-106
0805 3480	Bushing - 6mm	23-102
0805 3480	Bushing - 6mm	59-109
0805 3485	Bushing - 8x12x3.5mm	45-101
0805 3490	Bushing - 5x10x4 mm	45-105
0950 4006M	Philips Screw With Flat Washer - M4x6	47-105
0951 3005B	Philips Screw With Flat Washer M3x5	33-105
0951 3006B	Philips Screw With Flat Washer - M3x6	73-102
0951 3006B	Philips Screw With Flat Washer - M3x6	71-110
0951 3006B	Philips Screw With Flat Washer - M3x6	31-101
0951 3006B	Philips Screw With Flat Washer - M3x6	57-101
0951 3006B	Philips Screw With Flat Washer - M3x6	27-101
0951 3008B	Philips Screw With Flat Washer - M3x8	41-105
0951 4006B	Philips Screw With Washer - M4x6	29-104
0951 4006B	Philips Screw With Washer - M4x6	35-109
0951 4008B	Philips Screw With Washer - M4x8	53-102

Part No.	Description	Page and Index No.
0951 4008B	Philips Screw With Washer - M4x8	35-104
0951 4012B	Philips Screw With Flat Washer	65-103
0951 5010B	Philips Screw With Washer - M5x10	41-108
0952 4008B	Sem’s Screw - M4x8	65-109
0953 4008M	Screw - M4X8	9-105
0954 3010B	Philips Screw - M3x10	47-101
0954 4012B	Double Sems Screw - M4 X 12	47-102
0960 4005B	Philips Flange Screw - M4 X 5	33-101
0960 4010B	Philips Flange Screw - M4x10	77-101
0960 4012W	Philips Flange Screw - M4x12	17-102
0964 4006B	Tapping Screw With Flat Washer - M4x6	75-104
0964 4006B	Tapping Screw With Flat Washer - M4X6	9-107
0964 4008B	Tapping Screw With Flat Washer - M4x8	9-102
0964 4008B	Tapping Screw With Flat Washer - M4x8	73-107
0964 4008W	Tapping Screw With Flat Washer - M4x8	31-106
0965 3006B	Tapping Screw With Flat Washer M3x6	15-105
0965 3008B	Tapping Screw With Washer - M3x8	45-108
0965 3008W	Tapping Screw With Flat Washer - M3x8	29-105
0965 3010B	Tapping Screw - M3X10	43-104
0971 3006A	Philips Polycarbonate Screw - M3x6	43-109
1002 0307	Jumper Wire	81-184
1005 0890	Decal - TUV	9-106
1102 3822	Connector - 20P	81-197
1102 4052	Optional Connector	73-104
1102 4052	Optional Connector	71-102
1102 4202	Connector - 3p	81-102
1102 4205	CT Header- 6p	81-103
1102 4206	Connector - 7p	81-104
1102 4207	Connector - 8p	81-105
1102 4208	Connector - 9p	81-106
1102 4210	Connector - 11p	81-107
1102 4211	CT Header - 12p	81-108
1102 4212	CT Header - 15p	81-109
1102 4473	CT Connector - 2p	73-103

Part No.	Description	Page and Index No
1102 4497	Connector - 13p	81-110
1102 4619	Connector - 2p	81-111
1102 4620	CT Header - 3p	81-112
1102 4621	CT Header - 4p	81-113
1102 4623	CT Connector - 6p	81-114
1102 4624	CT Connector - 7P	81-115
1102 4625	CT Connector 8p	81-116
1102 4628	Connector - 11p	81-117
1102 4629	Connector - 12P	81-118
1102 4630	CT Connector	81-119
1102 4637	CT Connector - 8P	81-120
1102 4639	CT Connector - 10P	81-121
1102 4640	Connector - 11p	81-122
1102 4642	CT Connector - 15p	81-123
1102 4643	CT Connector - 2p	81-124
1102 5007	CT Header - 14p	81-125
1102 5305	Connector - 6P	81-126
1102 5605	Connector - 13P	81-127
1102 5718	Optical Fiber Connector	81-128
1102 6408	Connector - 30P	81-129
1102 6613	Relay Terminal - 2P	41-101
1102 6762	CT Connector - 13p	81-130
1103 1772	Pin Header - 6p	81-131
1103 1774	Pin Header - 8p	81-132
1104 0271	IC SOCKET - 28P	81-195
1104 0612	Connector - 40P	81-196
1105 0008	Nylon Clamp - 2n	31-110
1105 0192	Locking Support	67-101
1105 0192	Locking Support	73-101
1105 0196	Wire Clamp	45-107
1105 0199	Clamp	55-101
1105 0199	Clamp	67-102
1105 0199	Clamp	61-105
1105 0199	Clamp	59-106